Transmitted by the experts of the
Informal Working Group on
Measurement Uncertainties (IWG MU)

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agenda item 9

Proposal for a Supplement 01 to the Revision 7 of Consolidated Resolution on the Construction of Vehicles (R.E.3)

Submitted by the Informal Working Group on Measurement Uncertainties*

The text reproduced below was prepared by the experts from the Informal Working Group on Measurement Uncertainties (IWG MU) with the aim to amend Consolidated Resolution on the Construction of Vehicles (R.E.3) with remarks according to exterior noise measurements when performing type-approval, COP or field testing (e.g., market surveillance).

The modifications to the existing text of the Revision 7 are marked in **bold** for new or ~~strikethrough~~ for deleted characters.

* In accordance with the programme of work of the Inland Transport Committee for 2022 as outlined in proposed programme budget for 2022 (A/76/6 (Sect.20), para 20.76), the World Forum will develop, harmonize and update UN Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

I. Proposal

Table of Content, amend to read:

"Consolidated Resolution on the Construction of Vehicles (R.E.3)

Contents

Paragraph 3., amend to read:

“3. Scope of UN Regulations annexed to the 1958 Agreement

The scope of UN Regulations indicated below reflects the situation of the UN Regulations on ~~31. December 2021~~ **31 January 2023**. The scopes are shown by categories of vehicles, but some of them may be limited to a specific subcategory/class or to a minimum/maximum weight within the category.

UN Regulations are continuously adapted to the technical progress and their scope may be modified.

UN Regulation	*Title*	L_1	L_2	L_3	L_4	L_5	L_6	L_7	M_1	M_2	M_3	N_1	N_2	N_3	O_1	O_2	O_3	O_4	*T*	*R*	*S*	*NRMM*
	…																					
138	Uniform provisions concerning the approval of Quiet Road Transport Vehicles with regard to their reduced audibility (QRTV)								x	**x**	**x**	x	**x**	**x**								
	…																					
159	Uniform provisions concerning the approval of motor vehicles with regard to the Moving Off Information System for the Detection of Pedestrians and Cyclists (Moving Off Information Systems (MOIS))									x	x		x	x								
160	**Uniform provisions concerning the approval of motor vehicles with regard to the Event Data Recorder**								**x**			**x**										

UN Regulation	Title	L_1	L_2	L_3	L_4	L_5	L_6	L_7	M_1	M_2	M_3	N_1	N_2	N_3	O_1	O_2	O_3	O_4	T	R	S	NRMM
161	**Uniform provisions concerning the protection of motor vehicles against unauthorized use and the approval of the device against unauthorized use (by mean of a locking system)**								**x**			**x**										
162	**Uniform technical prescriptions concerning approval of immobilizers and approval of a vehicle with regard to its immobilizer**								**x**			**x**										
163	**Uniform provisions concerning the approval of vehicle alarm system and approval of a vehicle with regard to its vehicle alarm system**								**x**			**x**										
164	**Uniform provisions concerning the approval of studded tyres with regard to their snow performance**								**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**				
165	**Uniform provisions concerning the approval of audible reverse warning devices and of motor vehicles with regard to their audible reverse warning signals**									**x**	**x**		**x**	**x**								

"

Paragraph 4., amend to read:

"4. Active safety requirements

The table below contains the requirements or a group of requirements in the field of active safety, already adopted by the World Forum and included into UN Regulations. For any requirement or group of requirements, references are given to the relevant UN Regulations by their number in the 1958 Agreement and to the relevant Recommendations and Standard Annexes.

Subject	*Relevant documents*		
	UN Regulations annexed to the 1958 Agreement	*Recommendations*	*Standard Annexes*

Subject		*Relevant documents*		
		UN Regulations annexed to the 1958 Agreement	*Recommendations*	*Standard Annexes*
A.	Braking, power-driven vehicles, and theirs trailers	13, 13-H, 90	See paragraphs 8.1. to 8.3.2.	
B.	Braking, motor cycles	78	See paragraphs 8.1. to 8.3.2.	
C.	Audible warning device, the audible signals of motor vehicles	28, 138, **165**	See paragraph 8.4.	
D.	Lighting and light-signalling devices, power-driven vehicles	1, 2, 4, 5, 6, 7, 8, 19, 20, 23, 31, 37, 38, 45, 65, 77, 87, 91, 98, 99, 112, 119, 123, 148, 149	-	
E.	Lighting and light-signalling devices, motor cycles	50, 57, 72, 113, 148. 149	-	
F.	Lighting and light-signalling devices, mopeds	56, 76, 82, 128, 148	-	
G.	Lighting and light-signalling, installation, motor vehicles	48, 128	-	
H.	Lighting and light-signalling, installation, motor cycles	53, 128	-	
I.	Lighting and light-signalling, installation, mopeds	74, 128	-	
J.	Lighting and light-signalling, installation, agricultural tractors	86, 128	-	
K.	Retro reflecting devices, markings	3, 69, 70, 88, 104, 150	-	
L.	Pneumatic tyres and wheels for vehicles	30, 54, 64, 108, 109, 117, 124, **164**	-	
M.	Pneumatic tyres, commercial vehicles	54, 109, 117**, 164**	-	
N.	Pneumatic tyres, motor cycles/mopeds	75	-	
O.	Pneumatic tyres, tractors	106	-	
P.	Controls, tell-tales, motor vehicles	35, 121	-	1
Q.	Controls, tell-tales, motor cycles, mopeds	60	-	
R.	Forward field of vision, motor vehicles	125	-	1
S.	Indirect vision, motor vehicles and Blind Spot Information System, Devices for means of rear visibility or detection and Moving Off Information Systems	46, 151, 158, 159	-	1
T.	Rear-view mirrors, motor cycles, mopeds	81	-	
U.	Drivers field of vision, tractors	71	-	
V.	Speed limitation (SLD)	89	-	

Subject		*Relevant documents*		
		UN Regulations annexed to the 1958 Agreement	*Recommendations*	*Standard Annexes*
W.	Steering equipment	79	-	
X.	Lane Departure Warning System (LDWS), Automated Lane Keeping Systems (ALKS)	130, 157	-	
Y.	Advanced Emergency Braking Systems (AEBS), Brake Assist Systems and Electronic Stability Control	131, 139, 140, 144, 152	-	

“

Paragraph.7, amend to read:

“7. General safety requirements

The table below contains the requirements or a group of requirements in the field of general safety, already adopted by the World Forum and included into UN Regulations. For any requirement or group of requirements, references are given to the relevant UN Regulations by their number in the 1958 Agreement and to the relevant Recommendations and Standard Annexes.

Subject		*Relevant Documents*		
		UN Regulations annexed to the 1958 Agreement	*Recommendations*	*Standard Annexes*
A.	Protective helmets	22		
B.	Advance-warning triangles	27		
C.	Liquefied Petroleum Gas (LPG) vehicles, Compressed Natural Gas (CNG) vehicles and electric vehicles	67, 100, 110, 115, [137]		
D.	Coupling devices	55, 102	See paragraph 8.12.	
E.	Vehicles of specific use, ADR, tank vehicles	105, 111	-	
F.	Vehicle alarm and anti-theft systems	18, 62, 97, 116, **161, 162, 163**	See paragraph 8.24.	
G.	Buses and coaches	36, 52, 66, 107		
H.	Electromagnetic compatibility	10		
I.	Heating systems	122		
J.	Safety glazing	43		1
K.	Speedometer	39		

Subject		*Relevant Documents*		
		UN Regulations annexed to the 1958 Agreement	*Recommendations*	*Standard Annexes*
L.	Measures to prevent unauthorized modifications to mopeds and motor cycles in use	-	See paragraph 8.24.	
M.	Weight and axle load distribution	-	See paragraph 8.13.	
N.	Mudguards	-	See paragraph 8.27.	
O.	First aid kits	-	See paragraph 8.31.	

«

Paragraph.8.8.2, amend to read:

"8.8.2. **Exterior n**oise emitted by vehicles in use

8.8.2.1. **Checks at roadside and periodical technical inspection**

8.8.2.**1.**1. To facilitate the prevention […]

8.8.2.**1.**1.1. For vehicles of categories […]

8.8.2.**1.**1.2. For vehicles of categories L_2, L_4, L_5, […]

8.8.2.**1.**1.3. For vehicles of category L_3, […]

8.8.2.**1.**1.4. For vehicles of category L_1, […]

8.8.2.**1.**2. In view of the tolerances […]

8.8.2.**1.**3. The last-mentioned value, […]

8.8.2.**1.**4. Checks on vehicles brought […]

8.8.2.**1.**5. A visual inspection […]

8.8.2.2. Compliance assessment of vehicles of categories M and N

8.8.2.2.1. Scope

This paragraph provides specifications according to the sound-level measuring method, described in UN Regulation No. 51, when products are selected to verify their compliance to the exterior sound emission.

If the provided specifications in paragraph 8.8.2.2. need clarification, the requirements described in Annex 3 and Annex 7 of the 03 series of amendments of UN Regulation No. 51 shall be used.

8.8.2.2.2. Vehicle Selection

Vehicle shall be selected so that any of the following criteria are met:

- **Free of accidents**
- **The vehicle age shall be less than 5 years or have a mileage of less than 120.000km, whatever comes first**
- **All vehicle manufacturer defined inspection intervals are met and the vehicle is maintained accordingly**

- **If spare parts are mounted, they shall be Genuine Original Equipment Parts, especially for sound emission relevant components (according to vehicle type approval documentation).**
- **The vehicle shall have a use history, representative for normal use. A vehicle shall not be used, if has been subject to abusive driving. This includes, but not limited to, any club or street racing.**
- **Tyres shall be in an appropriate condition with regard to even wear, no obvious damage, be not older than 2 years and a milage of less than 10.000 km.**
- **Vehicle shall have original hard- and software for engine, drive train and any component with influence on the sound emission of the vehicle, such as for active exhausts systems, sound enhancement systems, etc.**
- **No optional equipment mounted such as, but not limited to, roof racks or bicycle racks, which could influence the sound emission of the vehicle.**

8.8.2.2.3. Preparation for Testing

Before tests on a selected vehicle are carried out, the vehicle engine, cooling system exhaust system and tyres shall be warmed up according to the specifications in UN Regulation No. 51.

If so equipped, propulsion batteries shall have a state-of-charge sufficiently high to enable all key functionalities according to the specifications of the vehicle manufacturer. Propulsion batteries shall be within their component temperature window to enable all key functionalities. Any other type of rechargeable energy storage system shall be ready to operate during the test.

A tyre inflation pressure as specified by the manufacturer is mandatory. The wheels of the vehicles shall be statically and dynamically balanced.

The fuel quality shall be in line with the manufacturer's specification for the nominal power of the engine.

8.8.2.2.4. During Testing

Tests on vehicles shall be carried out in accordance with the procedures that have been used for approval of this type of vehicle. For testing, the same pre-acceleration shall be used as documented in the type approval test report.

The variation of results between runs may be reduced if there is a 1-minute wait, at idle in neutral, between runs.

The documentation of the compliance assessment should at least meet the documentation level of the corresponding test report of type approval measurements e.g., air temperature, air pressure and humidity.

No regeneration of any exhaust emission equipment, such as but not limited to particle filter or NO_x filter shall occur during testing. In this case the measurement shall be discarded.

8.8.2.2.2.4. Considerations on measurement uncertainties

After the measurement, additional tyre rolling sound measurements shall be carried out in accordance to Supplement 7 to the 03 series of amendments to UN Regulation No. 51 or later versions.

If reference data for tyre rolling sound are available according to CASE 2 of Supplement 7 to the 03 series of amendments to UN Regulation No. 51 or later versions, the tyre rolling sound shall be normalized accordingly.

If no reference data are available, the tyre rolling sound shall be corrected to the reference temperature according to CASE 1 of Supplement 7 to the 03 series of amendments to UN Regulation No. 51 or later versions.

In view of the tolerances according to the different measurement conditions of 3rd party testing, it will be necessary to allow for a margin in comparison with the corresponding value recorded at the time of the type approval, that is based on the measurement uncertainties table described in the document for reference and in Annex 2 of this resolution.

The vehicle type shall be considered in conformity with the UN Regulation No. 51, when the reported sound level of the vehicle tested, rounded to the nearest integer, does not exceed the limit value specified in Paragraph 6.2.2. of UN Regulation No. 51 by more than the result representing the "Expanded Uncertainty (95%)" of "Field Test" in Annex 2.

"

Annex 2, replace by new Annex:

“~~Annex 2~~

~~Guidelines on measures ensuring the audibility of hybrid and electric vehicles~~

~~Preamble~~

~~The environmental benefits expected to be achieved by hybrid electric and pure electric road transport vehicles (HEV and EV) have resulted in vehicles becoming quiet. This has resulted in the removal of an important source of audible signal that is used by pedestrians (e.g. blind and low vision pedestrians) and road users (e.g. cyclists), to signal the approach, presence or departure of these vehicles.~~

~~The guideline is intended to present recommendations to manufacturers for a system to be installed in vehicles to provide vehicle operation information to pedestrians and vulnerable road users.~~

~~This guideline is intended as interim guidance until the completion of on-going research activities and the development of globally harmonized device performance specifications.~~

~~Scope~~

~~This guideline addresses Acoustic Vehicle Alerting System (AVAS) for hybrid electric and pure electric road transport vehicles (HEV and EV).~~

~~A. Acoustic Vehicle Alerting System~~

~~1. Definition~~

~~Acoustic Vehicle Alerting System (AVAS) is a sound generating device designed to inform pedestrians and vulnerable road users.~~

~~2. System performance~~

~~AVAS is intended to be fitted to a vehicle.~~

~~AVAS shall fulfil the requirements set forth below.~~

~~3. Operation conditions~~

~~(a) Sound generation method~~

~~The AVAS shall automatically generate a sound in the minimum range of vehicle speed from start up to approximately 20 km/h and during reversing, if applicable for that vehicle category. In case the vehicle is equipped with an internal combustion engine that is in operation within the vehicle speed range defined above, the AVAS may not need to generate a sound.~~

~~For vehicles having a reversing sound warning device, it is not necessary for the AVAS to generate a sound during backup.~~

~~(b) Pause switch~~

~~The AVAS may have a switch to stop its operation temporarily ("pause switch").~~

If a pause switch is introduced, however, the vehicle should also be equipped with a device for indicating the pause state of the vehicle approach informing device to the driver in the driver's seat.

The AVAS should remain capable of re-operating after stopped by a pause switch.

If fitted in the vehicle, a pause switch should be located in such a position that the driver will find and manipulate it with ease.

(c) Attenuation

The AVAS sound level may be attenuated during periods of vehicle operation.

4. Sound type and volume

(a) The sound to be generated by the AVAS should be a continuous sound that provides information to the pedestrians and vulnerable road users of a vehicle in operation.

However, the following and similar types of sounds are not acceptable:

(i) Siren, horn, chime, bell and emergency vehicle sounds;

(ii) Alarm sounds e.g. fire, theft, smoke alarms;

(iii) Intermittent sound.

The following and similar types of sounds should be avoided:

(iv) Melodious sounds, animal and insect sounds;

(v) Sounds that confuse the identification of a vehicle and/or its operation (e.g. acceleration, deceleration etc.).

(b) The sound to be generated by the AVAS should be easily indicative of vehicle behaviour, for example, through the automatic variation of sound level or characteristics in synchronization with vehicle speed.

(c) The sound level to be generated by the AVAS should not exceed the approximate sound level of a similar vehicle of the same category equipped with an internal combustion engine and operating under the same conditions.

Environmental consideration:

The development of the AVAS shall give consideration to the overall community noise impact.

Annex 2

Measurement Uncertainties in UN Regulation 51

The scope of the tables below reflects the situation of the "Measurement Uncertainties when Testing in WP.29 GRBP Vehicle Regulations" (GRBP-78-05).

The values are shown by different categories of vehicles (table 1 and table 2).

This Document for Reference is continuously adapted to the technical progress, and it is recommended to use the latest version that is published on the GRBP homepage as a document for reference.

Table 1: Measurement uncertainty table for M_1, N_1 and M_2 vehicles less than 3500 kg

Situation	*Input Quantity*	*Estimated deviations of the meas. result (peak-peak)*		*Impact on Lurb*	*Probability Distribution*	*Variance*	*Standard uncertainty*	*Share*	*Comb. stand. uncertainty*	*Uncertainty Budgets*			*expanded uncertainty 95%*
		Lwot	*Lcrs*							*Type Appro -val*	*CoP*	*Field Tests*	
Run to Run	Microclimate wind effect	1,60	1,50	1,57	gaussian	0,15	0,392	5,6%	0,53	0,53	0,53	0,53	1,1
	Driver #1: Deviation from centred driving	0,50	0,50	0,50	rectangular	0,02	0,144	0,8%					
	Driver #2: Start of acceleration	0,60	0,00	0,40	rectangular	0,01	0,144	0,5%					
	Driver #3: Speed variations of +/- 1km/h	0,30	0,50	0,50	rectangular	0,02	0,144	0,8%					
	Driver #4: Load variations during cruising	0,00	1,00	0,34	gaussian	0,01	0,085	0,3%					
	Varying background noise	0,40	0,40	0,40	rectangular	0,01	0,115	0,5%					
	Variation on operating temperature of engine (WOT) and tyres (WOT&CRS) => See ISO 362-1 note	0,80	0,80	0,80	rectangular	0,05	0,231	2,0%					
Day to Day	Barometric pressure (Weather +/- 30 hPa)	0,40	0,40	0,40	gaussian	0,01	0,100	0,4%	0,92	0,92	0,92	0,92	1,8
	Air temperature effect on tyre noise (5-10°C)	0,00	0,00	0,00	rectangular	0,00	0,000	0,02%					
	Air temperature effect on tyre noise (10-40°C)	2,20	3,60	2,67	rectangular	0,60	0,772	21,9%					
	Varying background noise during measurement	0,00	0,00	0,00	rectangular	0,00	0,000	0,0%					
	Air intake temperature variation	1,60	0,00	1,06	rectangular	0,09	0,305	3,4%					
	Residual humidity on test track surface	0,90	2,10	1,31	rectangular	0,14	0,377	5,2%					
Site to Site	Altitude (Location of Track) -100 hPa/1000m (fr.1015 to 915 hPa)	0,70	0,70	0,70	rectangular	0,04	0,202	1,5%	1,24		0,62	1,24	2,5
	Test Track Surface	3,40	5,50	4,11	rectangular	1,41	1,187	51,8%					
	Microphone Class 1 IEC 61672	1,00	1,00	1,00	gaussian	0,06	0,250	2,3%					
	Sound calibrator IEC 60942	0,50	0,50	0,50	gaussian	0,02	0,125	0,6%					
	Speed measuring equipment continuous at PP	0,10	0,10	0,10	rectangular	0,00	0,029	0,0%					
	Acceleration calculation from vehicle speed measurement	0,50	0,50	0,50	rectangular	0,02	0,144	0,8%					
Vehicle to Vehicle	Production Variation on Tyres; Aging of Tyres until delivery to customer (1dB after one year)	0,80	1,50	1,04	gaussian	0,07	0,259	2,5%	0,57		0,57	0,57	1,1
	Tyres at minimum tread depth	0,40	0,40	0,40	gaussian	0,04	0,209	1,8%					
	Variation on Tyre Size and Brand (non-OEM)	0,00	0,00	0,00	gaussian	0,00	0,000	0,0%					
	Production Variation in Power, incl. proper break-in of a brand-new engine	0,40	0,40	0,40	rectangular	0,01	0,115	0,5%					
	Battery state of charge for HEVs (3 dB(A))	0,00	0,00	0,00	rectangular	0,00	0,000	0,0%					
	Production Variability of Sound Reduction Components	1,10	0,00	0,73	gaussian	0,03	0,182	1,2%					
	Impact of variation of vehicle mass	1,60	1,60	1,60	rectangular	0,21	0,462	7,8%					
								100 %					

Overall Combined Uncertainty +/-	Expanded uncertainty (95%) +/-
1,73	**3,46**

Expanded uncertainty (95%) +/-		
Type Approval	**CoP**	**Field Test**
2,12	**2,71**	**3,46**

Table 2: Measurement uncertainty table for M_2 more than 3500 kg, N_2, M_3 and N_3 vehicles

Situation	*Input Quantity*	*Estimated deviations of the meas. result (peak-peak)*		*Impact on Lurb*	*Probability Distribution*	*Variance*	*Standard uncertainty*	*Share*	*Comb. stand. uncertainty*	*Uncertainty Budgets*			*expanded uncertainty 95%*
		Lwot	*Lcrs*							*Type Appro -val*	*CoP*	*Field Tests*	
Run to Run	Microclimate wind effect – head or tail	0	NA	0	gaussian	0,000	0,00	0,0%	0,30	0,30	0,30	0,30	0,59
	Deviation from centred driving	0,50	NA	0,50	rectangular	0,021	0,14	2,0%					
	Speed at BB' – Target vehicle speed (+/- 5 km/h), (target engine speed (+/-2%)	0,40	NA	0,40	rectangular	0,013	0,12	1,3%					
	Varying background noise	0,10	NA	0,1	gaussian	0,001	0,03	0,1%					
	Variation on operating temperature of engine and tyres => See ISO 362-1 note	0,80	NA	0,80	rectangular	0,053	0,23	5,1%					
Day to Day	Ambient temperature influence on sound transmission in air	0,6	NA	0,6	rectangular	0,030	0,17	2,9%	0,46	0,46	0,46	0,46	0,91
	Ambient barometric pressure influence on sound transmission in air	0,9	NA	0,9	rectangular	0,068	0,26	6,5%					
	Ambient humidity influence on sound transmission in air	0,1	NA	0,1	rectangular	0,001	0,03	0,1%					
	Ambient air temperature influence on engine power (based on R85)	1,0	NA	1,0	rectangular	0,083	0,29	8,0%					
	Ambient air temperature effect on ICE vehicles due to tyre noise (5-40°C)	0,4	NA	0,4	rectangular	0,013	0,12	1,3%					
	Barometric pressure effect on engine power (based on R85)	0,4	NA	0,4	rectangular	0,013	0,12	1,3%					
Site to Site	Altitude effect on combustion and sound propagation (Range: 1000 m) (95-105 kPa)	0,9	NA	0,9	rectangular	0,068	0,26	6,5%	0,50		0,50	0,50	1,0
	Test Track Surface	1,3	NA	1,3	gaussian	0,106	0,33	10,2%					
	Microphone Class 1 IEC 61672	1	NA	1	gaussian	0,063	0,25	6,0%					
	Sound calibrator IEC 60942	0,5	NA	0,5	gaussian	0,016	0,13	1,5%					
	Speed measuring equipment continuous at BB	0,1	NA	0,1	gaussian	0,001	0,03	0,1%					
Vehicle to Vehicle	Production Variation on Tyres; Aging of Tyres until delivery to customer (1dB after one year)		NA						0,70		0,35	0,70	1,4
	Tyre – generic dispersion (Normal, tread depth, inflation pressure, model etc)	2,8	NA	2,8	gaussian	0,49	0,70	47,2%					
	Production Variation in Power, incl. proper break-in of a brand-new engine		NA										
	Battery state of charge for HEVs (3 dB(A))		NA										
	Production Variability of Sound Reduction Components		NA										
	Test mass – variation as a consequence of the definition		NA										

100 %

Overall Combined Uncertainty +/-	**Expanded uncertainty (95%) +/-**
1,02	**2,04**

Expanded uncertainty (95%) +/-		
Type Approval	**CoP**	**Field Test**
1,09	**1,64**	**2,04**

"

II. Justification

Paragraph 3 — *Scope of UN Regulations annexed to the 1958 Agreement*

The table has been updated with new UN Regulations and for UN Regulation No. 138 some additional vehicle classes have been corrected to the scope.

Paragraph 4 — *Active safety requirements*

The table has been updated with new UN Regulations

Paragraph 7 — *General safety requirements*

The table has been updated with new UN Regulations.

Paragraph.8.8.2 — *Noise emitted by vehicles in use*

Regarding the 1958 agreement UN Regulations are focussed on Type approval and Conformity of Production (CoP). In addition, during lifetime of vehicles road side checks, periodical technical inspection, market surveillance and other 3rd party tests are somehow related to the content of UN Regulation, but not in scope. For UN Regulation No. 51 road side checks and periodical technical inspection have already been described in paragraph 8.8.2. of this consolidated resolution.

The results of the Informal Working Group on Measurement Uncertainties (IWG MU) show a significant increase of measurement uncertainties for field tests, like but not limited to market surveillance and 3rd party tests. These knowledge has been added to paragraph 8-.8.2.. In addition, some experiences regarding the vehicle selection, preparation and execution of tests have been adopted from the field of exhaust emissions.

Annex 2 — *Guidelines on measures ensuring the audibility of hybrid and electric vehicles*

This guideline was intended as interim guidance until the completion of on-going research activities and the development of globally harmonized device performance specifications. Since the UN Regulation No. 138 is established, this guideline is not needed anymore.

The group proposed to replace the guideline with the summarized results according to the investigations on “Measurement uncertainties in UN Regulation No. 51”. The results will be useful for understanding the additional recommendations in paragraph 8.8.2.