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### World Forum for Harmonization of Vehicle Regulations

### Working Party on Brakes and Running Gear

#### Seventieth session

Geneva, 12–13 May 2011

## Report of the Working Party on Brakes and Running Gear on its seventieth session (12–13 May 2011)

### Contents

	<i>Paragraphs</i>	<i>Page</i>
I. Attendance.....	1	2
II. Adoption of the agenda (agenda item 1) .....	2	2
III. Advanced Emergency Braking Systems (agenda item 2).....	3-15	2
IV. Other business (agenda item 3) .....	16-17	4
V. Provisional agenda for the seventy-first session.....	18	5

### Annexes

I. List of informal documents (GRRF-70-...) considered during the session.....	6
II. Adopted amendments to ECE/TRANS/WP.29/GRRF/2011/25 and ECE/TRANS/WP.29/GRRF/2011/26. ....	7

## **I. Attendance**

1. The Working Party on Brakes and Running Gear (GRRF) held its seventieth session from 12 to 13 May 2011 in Geneva. In the absence of Mr. I. Yarnold (United Kingdom), the meeting was chaired by Mr. S. Sopp (United Kingdom). 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 and TRANS/WP.29/690/Amend.1): Australia, Canada, Czech Republic, Denmark, France, Germany, Hungary, Italy, Japan, Netherlands, Poland, Russian Federation, Spain, Sweden, Switzerland and United Kingdom of Great Britain and Northern Ireland. An Expert from the European Commission (EC) also participated. Experts from the following non-governmental organizations participated: European Association of Automobile Suppliers (CLEPA), International Motorcycle Manufacturers Association (IMMA) and International Organization of Motor Vehicle Manufacturers (OICA).

## **II. Adoption of the agenda (agenda item 1)**

*Documentation:* ECE/TRANS/WP.29/GRRF/2011/19  
ECE/TRANS/WP.29/GRRF/2011/19/Corr.1

2. GRRF adopted the agenda ECE/TRANS/WP.29/GRRF/2011/19 and ECE/TRANS/WP.29/GRRF/2011/19/Corr.1.

## **III. Advanced Emergency Braking Systems (agenda item 2)**

*Documentation:* ECE/TRANS/WP.29/GRRF/2011/23  
ECE/TRANS/WP.29/GRRF/2011/24  
ECE/TRANS/WP.29/GRRF/2011/25  
ECE/TRANS/WP.29/GRRF/2011/26  
ECE/TRANS/WP.29/GRRF/2011/27  
Informal documents GRRF-70-01, GRRF-70-02-Rev.1, GRRF-70-03, GRRF-70-04, GRRF-70-05, GRRF-70-06, GRRF-70-07 and GRRF 70-08

3. The Chair of the informal group on Advanced Emergency Braking and Lane Departure Warning Systems (AEBS/LDWS) reported on the progress made by the informal group from the last GRRF session up to the meeting held from 9 to 11 May 2011 in conjunction with the proper session of GRRF.

4. He explained that guidance given by GRRF at its February 2010 session had been endorsed by the informal group: optional interrupting of the warning phase, the alleyway test for false reaction test, M<sub>1</sub> saloon cars or soft targets for test targets and radar frequency spectrum allocation not covered by the Regulation.

5. He added that a number of issues had not been solved by the informal group and still needed guidance from GRRF: The scope of the Regulation(s), vehicles that should be exempted from AEBS requirements, the criteria that shall be used for the warning/activation test and the regulatory approach.

6. Regarding the possible exemption of certain vehicles from AEBS requirements, the secretariat reminded GRRF that, for the sake of clarity and transparency, it was preferable for vehicles not covered by the Regulation, to be clearly listed in the scope part of the Regulation and not in a footnote in an Annex to the Regulation. The expert from EC

supported this view in GRRF-70-01 and considered that exemptions to some specific vehicles should remain in the hands of Contracting Parties and should therefore not be considered at UNECE level.

7. GRRF agreed that the only prerequisite for the fitting of AEBS was antilock braking systems (ABS) and that vehicles exempted from Electronic Stability Control (EVSC) should not directly be exempted from AEBS requirements. The expert from Italy initially raised a reservation but was prepared to accept the majority position on this particular point. GRRF noted the opposition by the expert from Germany over this decision

8. GRRF considered ECE/TRANS/WP.29/GRRF/2011/27 from CLEPA and OICA exempting buses of Class I, II and A from AEBS requirements, as well as special purpose vehicles and off-road vehicles because of possible incompatibility of AEBS with the design of these vehicles (AEBS dangerous for standing passengers, no space to fit AEBS radars, etc.). A number of experts were of the opinion that since some of these vehicles may be used on highways, it should be possible in principle to type approve them with AEBS and that exemptions for particular cases should be left to the Contracting Parties. In conclusion, GRRF agreed to provide guidance to the Contracting Parties on such vehicles in a specific paragraph of the preamble of the Regulation. GRRF agreed to have a final review of the wording of this paragraph, reproduced in Annex II, at its September 2011 session.

9. GRRF also discussed the issue as to whether the draft Regulation should include requirements for vehicles not equipped with pneumatic rear axle suspension (i.e. vehicles with rigid rear axle suspension). The expert from CLEPA presented GRRF-70-08 showing the vertical angle capability of AEBS sensors and that, for these vehicles, sensor system development was required. A number of experts were of the opinion that such vehicles should not be subject to the pass/fail values proposed in Annex 3 of the draft Regulation because the present AEBS were not able to cope with the variation of the pitch angle of these vehicles. Other experts were in favour of including such vehicles in Annex 3 of the draft Regulation to support the development of specific sensor systems for these vehicles. Other options considered by GRRF were to cover such vehicles in a further step of the Regulation or only require warning systems with no action on the brakes for these vehicles in a first step. GRRF could not reach a final decision and agreed to let WP.29 decide on this issue. GRRF requested the AEBS/LDWS informal group to study the possible options mentioned above, as well as the alternative proposal (GRRF-70-02-Rev.1) proposed by Germany. The AEBS/LDWS Chair agreed to hold a meeting of the informal group before the summer break (26-27 May 2011) on this topic.

10. GRRF discussed the pass/fail values proposed by the informal group for the warning and activation test in Annex 3 of the draft Regulation, in particular in GRRF-70-03, GRRF-70-04, GRRF-70-05 and GRRF-70-06. GRRF agreed in principle to have requirements for N<sub>2</sub> vehicles above 8 tonnes equipped with mitigation systems (row 2 of the table in GRRF-70-05) and deleted the "blank row" option for this group of vehicles.

11. With regard to the timing of the first warning mode for a moving target for collision avoidance requirements (i.e. cells E1 and E2 of the table in GRRF-70-06), GRRF noted the preference by the expert from Germany, for 2 seconds in particular for legal reasons. However, a majority of experts favoured 1.4 second. Therefore, GRRF agreed to delete the 2 second option and to keep the value of 1.4 second in square brackets in cells E1 and E2 of the table in GRRF-70-06 (avoidance systems) as well as in cell E1 of the table in GRRF-70-05 (mitigation systems).

12. GRRF could not agree on the other text in square brackets in the table (footnotes, row 3) (see also para. 9). For N<sub>2</sub> vehicles below 8 tonnes and M<sub>2</sub> vehicles (row 3), GRRF requested the AEBS/LDWS informal group to further discuss the possibility of further

developing the specific requirements for these vehicles, including requiring warning systems only or covering such vehicles in a further step.

13. On the regulatory approach, the AEBS/LDWS Chair recalled that, following the guidance given by GRRF at its September 2010 session, two separate draft Regulations were on the GRRF agenda: ECE/TRANS/WP.29/GRRF/2011/23 on collision avoidance emergency braking systems and ECE/TRANS/WP.29/GRRF/2011/24 on collision mitigation emergency braking systems. The AEBS/LDWS Chair added that, at the request of OICA, the informal group had reconsidered the possibility to combine the two sets of requirements into one single Regulation, taking the form of a base Regulation (Step 1- 00 series of amendments) (ECE/TRANS/WP.29/GRRF/2011/25), supplemented by an a 01 series of amendments (Step 2) (ECE/TRANS/WP.29/GRRF/2011/26). GRRF could accept in principle the latter approach provided adequate transitional provisions could be found between the two implementation steps.

14. The AEBS/LDWS Chair presented the draft transitional provisions between step 1 and step 2 of the draft Regulation prepared by the informal group in GRRF-70-06 superseding ECE/TRANS/WP.29/GRRF/2011/26, indicating that for none of these provisions consensus had been reached.. A number of experts were in favour of further simplifying these transitional provisions. However, GRRF could not reach a final decision and agreed to send the draft transitional provisions contained in GRRF-70-06, as reproduced in Annex II, for final decision by WP.29 at its November 2011 session.

15. Given the urgency of this draft Regulation for some Contracting Parties and considering that further progress might be difficult at GRRF level, GRRF agreed to send ECE/TRANS/WP.29/GRRF/2011/25 and ECE/TRANS/WP.29/GRRF/2011/26, amended by GRRF-70-04 and GRRF-70-05 as reproduced in Annex II to this report, for consideration by WP.29 and the Administrative Committee of the 1958 Agreement on Vehicle construction (AC.1), for consideration at their November 2011 session, as draft new Regulation on AEBS and draft 01 series of amendments to the new Regulation. It was noted that WP.29 would have to discuss, at its November 2011 session, the unresolved issues in square brackets in the draft text, in particular, which vehicles should be excluded from AEBS requirements and the appropriate transitional provisions that should apply between the above mentioned step 1 and 2. GRRF agreed to review these proposals at its September 2011 session.

#### **IV. Other business (agenda item 3)**

*Documentation:* ECE/TRANS/WP.29/2011/89 and ECE/TRANS/WP.29/2011/91  
Informal document GRRF-70-07

16. The GRRF Chair thanked CLEPA for the live demonstration on AEBS held during this GRRF session. The background of this presentation may be found in GRRF-70-07. A video on this demonstration as well as a press release may be found on the following website:

<http://live.unece.org/transwelcome/areas-of-work/vehicle-regulations/events/unece-live-demonstration-of-advanced-emergency-braking-systems-aeps.html>.

The chair also thanked OICA for the static demonstration showing special purpose and off-road vehicles where it could difficult to fit AEBS.

17. GRRF noted that Italy and the Russian Federation had submitted their national lane markings (ECE/TRANS/WP.29/2011/91 and ECE/TRANS/WP.29/2011/89) to be used in the draft New Regulation on Lane Departure Warning systems.

## **V. Provisional agenda for the seventy-first session**

18. GRRF noted that its seventy-first session would be held in Geneva from 13 September 2011 (starting at 9.30 a.m.) to 15 September 2011 (concluding at 5.30 p.m.). GRRF agreed that the AEBS/LDWS informal group would meet prior to its proper session on 12 September 2011 (time to be confirmed by the AEBS/LDWS Chair).

## Annex I

**List of informal documents (GRRF-70-...) considered during the session (English only)**

<i>No.</i>	<i>(Author) Title</i>	<i>Follow-up</i>
1	(EC) European Commission comments to ECE/TRANS/WP.29/GRRF/2011/27 (OICA/CLEPA request for exclusion of certain special vehicles from the scope of the draft Regulation(s) on AEBS, based on technico-economic reasons)	(f)
2-Rev.1	(Germany) Amendment to ECE/TRANS/WP29/GRRF/2011/23, 24, and 25	(f)
3	(AEBS/LDWS informal group) Proposal from the European Commission on behalf of the GRRF informal group on AEBS/LDWS for amendments to the document GRRF/2011/23	(f)
4	(AEBS/LDWS informal group) Proposal from the European Commission on behalf of the GRRF informal group on AEBS/LDWS for amendments to the document GRRF/2011/24	(f)
5	(AEBS/LDWS informal group) Proposal from the European Commission on behalf of the GRRF informal group on AEBS/LDWS for amendments to the document GRRF/2011/25	(b)
6	(AEBS/LDWS informal group) Proposal from the European Commission on behalf of the GRRF informal group on AEBS/LDWS for amendments to the document GRRF/2011/26	(b)
7	(CLEPA) Advanced Emergency Braking System (AEBS) - Demonstration organized by CLEPA at the Touring Club Swiss, Geneva on the 12th May 2011	(f)
8	(CLEPA) Advanced Emergency Braking System (AEBS) Sensor Technology – Vertical Angle Capability – Status	(f)

## Notes:

- (a) Submitted with no change to WP.29 for consideration.
- (b) Submitted with changes to WP.29 for consideration.
- (c) Resume consideration on the basis of an official document.
- (d) Kept as reference document/continue consideration.
- (e) Revised proposal for the next session.
- (f) Consideration completed or to be superseded.

## Annex II

### Adopted amendments to ECE/TRANS/WP.29/GRRF/2011/25 and ECE/TRANS/WP.29/GRRF/2011/26

#### Adopted amendments to ECE/TRANS/WP.29/GRRF/2011/25

Adopted amendments to ECE/TRANS/WP.29/GRRF/2010/2011/25 are shown in bold characters

*Paragraph 0*, amend to read:

#### **"0. Introduction (for information)**

The intention of this regulation is to establish uniform provisions for advanced emergency braking systems (**AEBS**) fitted to motor vehicles of the **categories** M<sub>2</sub>, M<sub>3</sub>, N<sub>2</sub> and N<sub>3</sub> **primarily** used under highway conditions.

**[While, in general, these vehicle categories will benefit from the fitting of an advanced emergency braking system, there are subgroups where the benefit is uncertain because they are primarily used in conditions other than highway conditions (e.g. buses with standing passengers i.e. classes I, II and A). In addition, regardless from the benefit, there are sub-groups where the installation of AEBS would be technically difficult (e.g. position of the sensor on vehicles of category G and special purpose vehicles, etc.).]**

The system shall automatically detect a potential forward collision, provide the driver with a warning and activate the vehicle braking system to decelerate the vehicle with the purpose of avoiding or mitigating the severity of a collision in the event that the driver does not respond to the warning.

The system shall only operate in driving situations where braking will avoid or mitigate the severity of an accident, and shall take no action in normal driving situations.

In the case of a failure in the system, the safe operation of the vehicle shall not be endangered.

The system shall provide as a minimum an acoustic or haptic warning, which may also be a sharp deceleration, so that an inattentive driver is made aware of a critical situation.

During any action taken by the system (the warning and emergency braking phases), the driver can, at any time through a conscious action, e.g. by a steering action or an accelerator kick-down, take control and override the system.

The regulation cannot include all the traffic conditions and infrastructure features in the type-approval process. Actual conditions and features in the real world should not result in false warnings or false braking to the extent that they encourage the driver to switch the system off."

*Paragraph 2.3.*, renumber as paragraph 2.2. and amend to read:

- "2.2.            *"Vehicle type with regard to its **Advanced Emergency Braking System**"*  
means a category of vehicles which do not differ in such essential respects as:
- (a)    The manufacturer's trade name or mark,
  - (b)    Vehicle features which significantly influence the performances of the  
Advanced Emergency Braking System,
  - (c)    The type and design of the Advanced Emergency Braking System."

*Paragraph 5.2.2.*, amend to read:

- "5.2.2.        Subsequent to the warning(s) of paragraph 5.2.1.1., and subject to the  
provisions of paragraphs 5.3.1. to 5.3.3., there shall be an [emergency  
braking / **deceleration**] phase having the purpose of significantly decreasing  
the speed of the subject vehicle. This shall be tested in accordance with  
paragraphs 6.4. and 6.5."

*Paragraph 6.8.*, the remaining bracket at the beginning of the paragraph should be deleted.

*Paragraph 6.8.1.(b)*, the remaining brackets should be deleted.

*Annex 1, paragraph 15, 5th line*, the brackets shall be deleted.

Annex 3, the table, amend to read:

### "Warning and activation test requirements – pass/fail values

A	Stationary target			Moving target				H
	Timing of warning modes		Speed reduction (ref. paragraph 6.4.4.)	Timing of warning modes		Speed reduction (ref. paragraph 6.5.3.)	Target speed (ref. paragraph 6.5.1.)	
	At least 1 haptic or acoustic (ref. paragraph 6.4.2.1.)	At least 2 (ref. paragraph 6.4.2.2.)		At least 1 haptic or acoustic (ref. paragraph 6.5.2.1.)	At least 2 (ref. paragraph 6.5.2.2.)			
M <sub>3</sub> and N <sub>3</sub> <i>[1], [2], [4]</i>	Not later than 1.4 s. before the start of emergency braking phase	Not later than 0.8 s. before the start of emergency braking phase	Not less than 10 km/h	Not later than 1.4 s. before the start of emergency braking phase	Not later than 0.8 s. before the start of emergency braking phase	No impact	32 ± 2 km/h	1
N <sub>2</sub> > 8t <i>[3], [4]</i>	Not later than 1.4 s. before the start of emergency braking phase]	Not later than 0.8 s. before the start of emergency braking phase]	Not less than 10 km/h	Not later than [1.4 s] before the start of emergency braking phase	Not later than 0.8 s. before the start of emergency braking phase	No impact	32 ± 2 km/h	2
N <sub>2</sub> ≤ 8t and M <sub>2</sub> <i>[3], [5]</i>	[No restriction regarding timing and warning modes <sup>a</sup> ]  or [Blank]	[No restriction regarding timing and warning modes <sup>a</sup> ]  or [Blank]	[0 km/h <sup>b</sup> ]  or [Blank]	[No time restriction]  or [Blank]	[Not later than 1.4 s. before the start of emergency braking phase <sup>c</sup> ]  or [Blank]	[0 km/h <sup>d</sup> ]  or [Blank]	[32 ± 2 km/h]  or [Blank]	3

<sup>1</sup> Vehicles with pneumatic-hydraulic braking system (AoH) are subject to the requirements of row 2

<sup>2</sup> Vehicles of category M<sub>3</sub> with hydraulic braking system are subject to the requirements of row 3.

<sup>3</sup> Vehicles with pneumatic braking system are subject to the requirements of row 1.

<sup>4</sup> Applicable only to vehicles with pneumatic rear axle suspension.]

<sup>5</sup> Reservation from J for light M<sub>2</sub>/N<sub>2</sub> vehicles.

<sup>a</sup> For zero speed reduction, the start of the emergency braking phase is time to collision. In this case, paragraph 6.4.3. does not apply.

<sup>b</sup> Speed reduction optional.

<sup>c</sup> For zero speed reduction, the start of the emergency braking phase is time to collision.

<sup>d</sup> In this case, paragraph 6.5.3. does not apply. Speed reduction optional."

## Adopted amendments to ECE/TRANS/WP.29/GRRF/2011/26

Adopted amendments to ECE/TRANS/WP.29/GRRF/2010/2011/26 are shown in bold characters

*Paragraphs 12. to 12.6., amend to read:*

### [12. Transitional provisions

- [12.1. ~~As from the official date of entry into force of the 01 series of amendments, no Contracting Party applying this Regulation shall refuse to grant UNECE type approvals under this Regulation as amended by the 01 series of amendments.~~]
- [12.2. Contracting Parties applying **[the 00 Series of Amendments to]** this Regulation shall not be prohibited from granting UNECE type approvals and extensions of UNECE type approvals to the 00 series of amendments to this Regulation.]
- [12.3. As from the official date of entry into force of the 01 series of amendments, no Contracting Party applying this Regulation shall refuse national or regional type approval of a vehicle type approved to the 01 series of amendments to this Regulation.]
- [12.4. ~~As from the official date of entry into force of the 01 series of amendments, no Contracting Party applying this Regulation shall refuse first national or regional registration of a vehicle which complies with the requirements of the 01 series of amendments to this Regulation.~~]
- [12.5. Until [1 November 2016 / **1 November 2012**], no Contracting Party applying this Regulation shall refuse national or regional type approval of a vehicle type approved to the 00 series of amendments to this Regulation.]
- [12.6. Until [1 November **2020** / **1 November 2018**] [1 November **2020** / **1 November 2014**], no Contracting Party applying this Regulation shall refuse first national or regional registration of a vehicle which complies with the requirements of the 00 series of amendments to this Regulation.]

Annex 3, the table, amend to read:

### "Warning and activation test requirements – pass/fail values

A	Stationary target			Moving target			H	
	Timing of warning modes		Speed reduction (ref. paragraph 6.4.4.)	Timing of warning modes		Speed reduction (ref. paragraph 6.5.3.)		
	At least 1 haptic or acoustic (ref. paragraph 6.4.2.1.)	At least 2 (ref. paragraph 6.4.2.2.)		At least 1 haptic or acoustic (ref. paragraph 6.5.2.1.)	At least 2 (ref. paragraph 6.5.2.2.)			
M <sub>3</sub> and N <sub>3</sub> <sup>[1], [3]</sup>	Not later than 1.4 s. before the start of emergency braking phase	Not later than 0.8 s. before the start of emergency braking phase	Not less than 20 km/h	Not later than [1.4] s. before the start of emergency braking phase	Not later than 0.8 s. before the start of emergency braking phase	No impact	12 ± 2 km/h	1
N <sub>2</sub> > 8 t <sup>[3]</sup>	Not later than 1.4 s. before the start of emergency braking phase	Not later than 0.8 s. before the start of emergency braking phase	Not less than 20 km/h	Not later than [1.4] s. before the start of emergency braking phase	Not later than 0.8 s. before the start of emergency braking phase	No impact	12 ± 2 km/h	2
N <sub>2</sub> ≤ 8 t and M <sub>2</sub> <sup>[2], [4]</sup>	[No restriction regarding timing and warning modes <sup>a</sup> ]  or [Blank] <sup>[4]</sup>	[No restriction regarding timing and warning modes <sup>a</sup> ]  or [Blank] <sup>[4]</sup>	[0 km/h <sup>b</sup> ]  or [Blank] <sup>[4]</sup>	[No time restriction]  or [Blank] <sup>[4]</sup>	[Not later than 1.4 s. before the start of emergency braking phase <sup>c</sup> ]  or [Blank] <sup>[4]</sup>	[0 km/h <sup>d</sup> ]  or [Blank] <sup>[4]</sup>	[12 ± 2 km/h]  or [Blank] <sup>[4]</sup>	3

<sup>1</sup> Vehicles of category M<sub>3</sub> with hydraulic braking system are subject to the requirements of row 3

<sup>2</sup> Vehicles with pneumatic braking system are subject to the requirements of row 1

<sup>3</sup> Applicable only to vehicles with pneumatic rear axle suspension]

<sup>4</sup> Reservation from J for light M<sub>2</sub>/N<sub>2</sub> vehicles

<sup>a</sup> For zero speed reduction, the start of the emergency braking phase is time to collision. In this case, paragraph 6.4.3. does not apply.

<sup>b</sup> Speed reduction optional.

<sup>c</sup> For zero speed reduction, the start of the emergency braking phase is time to collision.

<sup>d</sup> In this case, paragraph 6.5.3. does not apply. Speed reduction optional."