DRAFT REPORT

4th meeting of the Informal Working Group (IWG) on Advanced Emergency Braking Systems (AEBS) for light vehicles

16-17 May 2018,
in Tokyo, Japan,

Chairman: Mr. Antony Lagrange (EC) and Mr. Toshiya Hirose (Japan)
Secretariat: Mr. Olivier Fontaine (OICA) and Mr. Yukihiro Shiomi (Japan)

1. **Welcome and Introduction**

2. Approval of the agenda

Document: AEBS-04-02 (Chair)

The agenda was approved with no change

3. Adoption of the report of the 3rd meeting of the Informal Working Group

Document: AEBS-03-09

The notes of the 3rd meeting were distributed close to the end of the session. The draft report was edited during the 4th session, and the participants committed to comment prior the 25th of May.

4. Review of the action points from the 3rd meeting in Brussels

Document: AEBS-03-07-Rev.1

Paragraph 2.2 (definition of "emergency braking"): debate on whether adding a deceleration demand value for well discriminating the emergency braking.
Targets: D informed that there is an oncoming ISO standard on the issue: D suggested referring the ISO 19206 in the text of the regulation.
OICA was keen that the targets are not too much described, as in UN R131
D could agree that the passenger car target is currently not so well defined, hence needs to be well defined, as the braking systems in general are quite robust, but requested making a reference to the ISO standard for the pedestrian target.
NL proposed a description, then adding a reference to the standard as a relevant example "e.g. as in ISOXXX".
Conclusion: keep the definitions unchanged, and discuss the targets under section 6.

The group had confirmation that the bicycle scenario must be in the text as from the beginning, and that the implementation can be discussed later (see terms of reference per document GRRF-84-03).
There was a debate on TTC: J had concern about the shape of the vehicle front: if it is a rounded front, then the TTC may be changed. Yet the front is usually symmetrical hence the most forward point is in the middle.
Conclusion: need to further discuss since the pedestrian may not be in the middle at the time of impact.

Activation: OICA keen that the tests are such that the delta speed should not force the subject vehicle to drive above 50 km/h.

Regulated upper speed:

AUS provided information on their national fleet situation
D, supported by other contracting parties, was keen to regulate the upper speed at 60 km/h, since it would be difficult to explain to the media that the accident occurred because the system was switched off at 50km/h sharp.
OICA was keen for 50 km/h since the efforts requested to the manufacturers are not balanced by the benefits of going to 60 lm/h. In addition, the safety margin applied by the OEM for guaranteeing approval ensures that the upper speed will always be ca. 10% above the regulated value. OICA presented slides 15-16 of the AEBS-04-03: the accidentology supports an upper speed of 50 km/h.
Conclusion: To be reviewed when the performance requirements will be discussed, perhaps degraded performances between 50 and 60 km/h

Regulated lower speed.
D informed that their accident data are of no much help, they could even accept a lower speed of 20 km/h.
The European Commission suggested downgraded performances at speeds < 10 km/h.
NL was keen to keep 10 km/h.
OICA informed about the technical limitation to detect crossing scenario at speeds lower than 10 km/h. A too wide detection angle for addressing the low speeds would make the sensor too inaccurate at other speeds. With 45°, the speed of the vehicle can be twice that of the pedestrian, this addresses the 10 km/h value in the case of C2P.
OICA proposed the following: C2C: 10 km/h and C2P crossing scenario: 20 km/h.
The chair then summarized that the group keeps 10 km/h as a regulated lower speed. There should be regulated performances between 20 and 60 for C2B, and no abrupt function cut-off beyond 50 km/h will be reflected in the regulation.

Manual deactivation
D found the manual deactivation not acceptable. The expert presented slide 17 from document AEBS-04-05: the sensor possible misalignment should not be an argument since the automatic deactivation can occur thanks to a self-check.
OICA explained that the data treatment implies that misalignment detection can take up to 2,5 km in normal driving situations.
There was a debate on the way to address the false interventions: the usual driver may or may not manually deactivate the system.
OICA informed that making the manual deactivation demanding would make it rare in the real world.
NL stressed that it is nonsense to mandate a system and then make it possible to deactivate. On the other hand, in real world, not many drivers will deactivate the system. NL had no strong position on this and could support the “not too easy” approach.
AUS explained the possible link to ESC, would agree a 2-step deactivation.
The European Commission had sympathy for the automatic deactivation, yet OICA pointed out that automatic deactivation increases the requirements hence the demand to the manufacturers and the final user.
Conclusion: D and Industry to bilaterally discuss the issue and find a compromise.

Override:
OICA promoted the wording of the skeleton text.
AUS: concern that the system is used as a comfort system.
D presented the document AEBS-04-05

- LPS approach should be considered as a non-emergency driving, rather a planned manoeuvre (e.g. driving around parked vehicles).
- The AEBS should not wait for the driver to initiate an emergency avoidance manoeuvre
- „Last Point To Steer“ should be kept at a total of 0.9 seconds (D showed videos to give audience a feel for the values).

OICA presented Slide 6, 7 and 8 of AEBS-04-03, showing a study about lateral acceleration. The values are similar to those of D. Yet the data do not take into account the dynamic capabilities of the vehicles.
J pointed out that the D study focus on low G passenger cars, and that the taller vehicles should be taken into account as well.

Table of basic C2C criteria: decision making exercise – summary of positions

	D	**OICA**	**J**

LPS	0,9s	0,85 s	0,6 to 1,8 s
LPB	9m/s² + 0,6s	5,76 m/s² (M1) and 4,0 m/s² (N1)	6,43 (as R13H)
Lateral offset	2.0 m	2,5 m	
Lateral acceleration			
Longitudinal deceleration	9,0 m/s²		6,43 m/s² (as R13H)
Speed reduction (full avoidance up to)	42 km/h (M1)	35 km/h (M1) 24 km/h (N1)	50 km/h (M1 in stationary target scenario) 40 km/h (M1 in moving target scenario - 60/20 km/h)

Some experts wondered whether OICA and D are addressing the same criteria in the same conditions
The group reviewed the UK position paper AEBS-04-06
Slide 3: the 1st graph just illustrates the general principle, and the 2nd graph shows the Industry position.
The UK also proposed addressing degraded conditions.
Need to well indicate that the required performance cannot be achieved in al conditions.
There was a debate on the necessity to address the degraded conditions.
NL: supported that the regulation should address the perfect test conditions only, and perhaps the ABS cycling in case of low adhesion.
Conclusion: need to cover the limits/assumption of the regulation (e.g. in the preamble).
J stressed that speed reduction is the key parameter for them.

Braking capabilities
Debate on the OICA vs. D positions with regard to braking capabilities.
It was stressed how difficult it is to a government to defend a braking performance of 6,4 m/s² while state of the art is about 10m/s².
D was keen to mandate "state of the art". The chair requested OICA to provide information about state of the art.
Conclusion: Industry to provide information on the state of the art with regard to the current production braking capabilities.

AEBS activation timing and braking profile
D and OICA supported having no value as it is design restrictive, except a value in speed reduction. The AEBS prescribed deceleration should not be greater than that prescribed in R13H (5,76 and 4,00 m/s²)
The chair found necessary to introduce a value at some place in order to address the definition of AEBS somehow.
NL pointed out that in UN R13H, paragraph 5.2.23., there is a value for emergency stop signal (ESS)
J found the NL position is consistent.
OICA clarified their proposal for the value of connected engine as it is the relevant one for reflecting the real world conditions, while the disconnected engine situation is aimed at assessing the braking system performances as such.
Conclusion: Item subject to further investigation

Emergency braking phase performance
Chair proposal to define the EB phase as a demand above 6,43 m/s²
D challenged that approach as the warning phase is not necessary, hence the definition of EB phase is not necessary to discriminate the 2 phases.
There was a debate on the mandatory deceleration vs. flexibility, i.e. 4,34 m/s² vs. not using the AEBS as a comfort system. D proposed an average value of 3,8 m/s², with at least a peak at 6,43 m/s² to make it uncomfortable, as a compromise between the J and the NL position.

Pedestrian scenario: speed detection
D presented their approach for pedestrian detection and collision avoidance per document AEBS-04-05.

CLEPA questioned the possibility to further investigate the case when the pedestrian is avoided due to the subject vehicle braking. D answered that this situation occurs only in some conditions; it should be counted as avoidance.
OICA presented slide 14 of AEBS-04-03: proposal to decrease speed such to avoid a significant challenge (total avoidance) since figures show a tremendous increase of risk as from 30 km/h collision speed.
There was a debate on whether the Industry approach could be acceptable.
J could not support the Industry approach since their document GRRF-83-17 proposes some flexibility with a range.
The group agreed to follow the "X critical" approach (D presentation AEBS-04-05, slide 15).
The experts acknowledged that the sensor data treatment needs additional time and could lead to a scatter of the speed reductions.

Table of basic C2P scenario: decision making exercise – summary of positions

	D	**OICA**	**J**
LPS	-	-	-
LPB (s)	0,9	Step 1: 0,72 Step 2: 0,9	[1,1]
Vehicle width	2m	2 m	[2m]
Safety margin / tolerance	30 cm, or Equivalent tolerance	Step 1: 0 cm Step 2: 30 cm	[50 cm]
Longitudinal deceleration	9 m/s² + 0,6 s (M1) ??? (N1)	5,76 m/s² (MFDD – M1) 4,00 m/s² (MFDD – N1)	[6,43 m/s²]
Speed reduction / up to	Full avoidance / 42	Full avoidance / M1: Step 1: 30 Step 2: 37 N1: Step 1: 21 Step 2: 26	Full avoidance / 50

Bicyclist scenario
The group tentatively undertook starting a similar exercise for the bicyclist scenario.

C2B scenario table

	D	**OICA**	**J**
LPS			
LPB (s)			
Vehicle width			
Safety margin / tolerance			
Longitudinal deceleration			
Speed reduction / up to			

NL informed TNO having finalized the CATS Final project summary report (CATS: Cyclist-AEB Testing System), that can be downloaded at http://publications.tno.nl/publication/34622256/JhJVIl/TNO-2016-R10921.pdf. Introductory excerpt: "To support and prepare the introduction of Cyclist-AEB systems and the appropriate consumer tests of such systems, TNO has taken the initiative to set-up a project with passenger car manufacturers and suppliers with the support of research and development partners (such as BASt and 4activeSystems) to develop a testing system and test protocol for Cyclist-AEB systems: CATS, Cyclist-AEB Testing System.

D informed that apparently, while the crossing scenario is best represented statistically (ca 25% of fatalities in longitudinal scenario vs. about 50% of fatalities in crossing scenario), the longitudinal scenario seems technically easier to capture.

Industry pointed out that there is currently no experience with cyclist dedicated AEB scenarii. Hence these can be discussed theoretically, but no decision can done to date on the values.
There was an agreement in principle on the test scenario, yet the experts acknowledged the necessity to address the performance requirements.
D stressed that the sensor detection angle is one of the key parameters. The expert suggested starting from the existing available sensor angles, then elaborating from there. D requested Industry to provide data about the current production
Conclusion: item to be further discussed at AEBS-5

HMI – self-check:
OICA suggested a copy/paste from R131
A debate started on the sensor self-check
Conclusion self-check: HW for Industry

HMI - Collision warning:
OICA presented their position per Slide 13 of AEBS-04-03
D accepted a non-mandatory collision warning, yet with some conditions. Could not accept a mandatory limitation of braking during the warning phase. A mandatory warning could ultimately decrease the performances of the AEBS since time would be lost and this could lead to a warning with no braking. The braking and the warning are separate issues, and some emergency braking could be acceptable in the warning phase.
J welcomed the principle of the OICA approach, yet could not support the combined warning and braking.
OICA explained that the slide 13 in the Industry presentation
Conclusion: J homework to confirm their position.

The group acknowledged that a collision warning is difficult to develop in the crossing scenario
NL suggested: “there shall be a warning at the latest when the braking starts.”

Test scenarii
OICA keen to have a group decision about max speed (50 vs. 60 km/h)
D was keen that there is clear definitions of the targets (M1 vehicle, pedestrian, etc.) since there exist targets nowadays. If reference to ISO standard, then static reference (identifying the year) and as an example only.

Daylight scenario: need to decide adult vs. child dummy

Nightlight scenario: to be addressed at a further stage. Camera based systems might have decreased performances in nightlight conditions. D refuses automatic switch-off at nightlight, yet agrees degraded performance.

Pre-conditioning: OICA keen that the pre conditioning be decided between the Technical Service and the manufacturer.

Test conditions: D was keen to have a range of test speeds, rather than one test speed. The expert found this approach aligned on the European Commission position for new regulations, and suggested increments of ideally 1km/h for performance requirements (of course not all tested). If the test is not destructive, there is no good reason to limit the number of tests. OICA suggested testing at one speed, then demonstrating by any means at other speeds. J flagged the CEL Annex with safety assessment. All speed ranges are addressed there. J suggested to cover this via the CEL annex. NL found the CEL annex not specific enough.
Conclusion: the text must clearly state that the full range must be covered, then the number of tests is defined in the test section

Failure detection: copy/paste R131

Deactivation: copy/paste R131

False Reaction test: copy/paste R131 provisions, yet only applicable to the C2C. Similar test would be implemented for C2P and C2B (with 1 target only)

ASPECSS: CLEPA to provide info on false reaction test (moving then stopping pedestrian)
Conclusion: Industry to provide relevant proposal. Industry and J HW

PTI
D informed that some ongoing work might make it necessary that the text need to evolve.
Conclusion: copy/paste from R131, as it is sufficient for the time being. Subject to cross check with other regulations.

Implementation strategy:
A discussion took place on the phase-in strategy. NL was of the opinion that C2B technology is mature enough on the basis of all the studies and test performed over the last years and had hope that C2B is included at the same time as C2C and C2P. This opinion was not supported broadly by the group i.e. some experts were of the opinion that the technology for bicycle detection is not mature for the time being. Yet all agreed that the experience on bicycle detection is limited for the time being
Conclusion: HW for next meeting.

5. Discussion for draft proposal of AEBS (car to car, car to pedestrians, car to bicycle)

Document: AEBS-04-03 (Chair)
04-04 (J)
04-05 (D)
04-06 (UK)

J presented the document AEBS-04-04

- Reference to R10: OK with proposal
- CEL annex: Agreed to delete “complex” as an alignment on UN R79. As this AEBS regulation will be a new one, then easy to align from scratch. Conclusion: to be cross-checked until next meeting
- Paragraph 5.2.1.1.: D against mandatory warning. Industry challenges the wording “relative”.
- Addition of references to N1 category as well

Documents AEBS-04-05, AEBS-04-06 and AEBS-04-03 were considered during the meeting.

6. Other business

7. List of action items

Comments to draft report of 3rd meeting of AEBS to be forwarded to the Secretary by end of next week (25 May)
The skeleton document will contain the C2C, C2P and C2B in separate sections.

Next meeting starts at 10:00 am and closes at 3:00 pm at SMMT on 26-27 June
Review of the draft agenda of the 5th meeting
Secretary to collect the action points and post them on the website
Draft skeleton to be posted on the website by 15 June
6th meeting: 1-2 October in Paris at OICA
7th meeting: probably early December if necessary