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Item 4.7.7. of the provisional agenda

1958 Agreement:

Consideration of draft amendments to existing

UN Regulations submitted by GRVA

Proposal for the 02 series of amendments to UN Regulation No. 152 (AEBS for M₁ and N₁)

Submitted by the Working Party on Automated/Autonomous and Connected Vehicles*

The text reproduced below was adopted by the Working Party on Automated/Autonomous and Connected Vehicles (GRVA) at its seventh session in September 2020 (ECE/TRANS/WP.29/GRVA/7, paras. 55). It is prepared following the recommendations provided by the World Forum for Harmonization of Vehicle Regulations (WP.29) at its November 2020 session and the guidance provided by GRVA at its December 2020 session. It is based on ECE/TRANS/WP.29/GRVA/2020/27, modified. It is submitted to the World Forum for Harmonization of Vehicle Regulations (WP.29) and to the Administrative Committee (AC.1) for consideration at their March 2021 sessions

* In accordance with the programme of work of the Inland Transport Committee for 2020 as outlined in proposed programme budget for 2020 (A/74/6 (part V sect. 20) para 20.37), 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.



Paragraph 1., introduce a new paragraph (c), to read:

"1. Scope

This UN Regulation applies to the approval of vehicles of Category M₁ and N₁¹ with regard to an on-board system to

- (a) Avoid or mitigate the severity of a rear-end in lane collision with a passenger car,
- (b) Avoid or mitigate the severity of an impact with a pedestrian~~,~~
- (c) Avoid or mitigate the severity of an impact with a bicycle."

Insert a new paragraph 2.9., to read (and re-number the following paragraphs)

"2.9. "Bicycle Target" means a soft target that represents a bicycle with cyclist"

Insert a new paragraph 5.1.1.4., to read:

"5.1.1.4. Of paragraph 5.2.3. of this Regulation for vehicles submitted to approval for Car to bicycle scenario."

Paragraph 5.1.5., amend to read:

"5.1.5. Emergency braking

Subject to the provisions of paragraphs 5.3.1. and 5.3.2., the system shall provide emergency braking interventions described in paragraphs 5.2.1.2., 5.2.2.2. and 5.2.3.2. having the purpose of significantly decreasing the speed of the subject vehicle."

Insert a new paragraph 5.2.3. (and subparagraphs), to read:

"5.2.3. Car to bicycle scenario

5.2.3.1. Collision warning

When the AEBS has detected the possibility of a collision with a bicycle crossing the road at a constant speed of 15 km/h- a collision warning shall be provided as specified in paragraph 5.5.1. and shall be provided no later than the start of emergency braking intervention.

The collision warning may be aborted if the conditions prevailing a collision are no longer present.

5.2.3.2. Emergency braking

When the system has detected the possibility of an imminent collision- there shall be a braking demand of at least 5.0 m/s² to the service braking system of the vehicle.

The emergency braking may be aborted if the conditions prevailing a collision are no longer present

This shall be tested in accordance with paragraph 6.7. of this Regulation.

5.2.3.3. Speed range

The system shall be active at least within the vehicle speed range between 20 km/h and 60 km/h and at all vehicle load conditions., unless deactivated as per paragraph 5.4.

5.2.3.4. Speed reduction by braking demand

¹ As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.6, para. 2 - www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html

In absence of driver's input which would lead to interruption according to paragraph 5.3.2., the AEBS shall be able to achieve an impact speed that is less or equal to the maximum relative impact speed as shown in the following table:

- (a) With unobstructed perpendicularly crossing bicycles with constant speeds from 10 to 15 km/h;
- (b) In unambiguous situations (e.g. not multiple bicycles);
- (c) On flat, horizontal and dry roads;
- (d) In maximum mass and mass in running order conditions;
- (e) In situations where the anticipated impact point of the crankshaft of the bicycle is displaced by not more than 0.2 m compared to the vehicle longitudinal centre plane;
- (f) In ambient illumination conditions of at least 2000 Lux without blinding of the sensors (e.g. direct blinding sunlight).
- (g) In absence of weather conditions affecting the dynamic performance of the vehicle (e.g. no storm, not below 273.15K or 0°C) and
- (h) When driving straight with no curve, and not turning at an intersection.

It is recognised that the performances required in this table may not be fully achieved in other conditions than those listed above. However the system shall not deactivate or unreasonably switch the control strategy in these other conditions. This shall be demonstrated in accordance with Annex 3 of this Regulation.

Maximum Impact Speed (km/h) for M₁*

<i>Subject vehicle speed (km/h)</i>	<i>Maximum mass</i>	<i>Mass in running order</i>
20	0.00	0.00
25	0.00	0.00
30	0.00	0.00
35	0.00	0.00
38	0.00	0.00
40	10.00	0.00
45	25.00	25.00
50	30.00	30.00
55	35.00	35.00
60	40.00	40.00

All values in km/h

* For subject vehicle speeds between the listed values (e.g. 53 km/h), the maximum relative impact speed (i.e.35/35 km/h) assigned to the next higher relative speed (i.e. 55 km/h) shall apply.

For masses above the mass in running order, the maximum relative impact speed assigned to the maximum mass shall apply.

Maximum Impact Speed (km/h) for N₁*

<i>Subject vehicle speed (km/h)</i>	<i>Maximum mass</i>	<i>Mass in running order</i>
20	0.00	0.00
25	0.00	0.00
30	0.00	0.00
35	0.00	0.00
36	0.00	0.00
38	15.00	0.00
40	25.00	0.00
45	30.00	25.00
50	35.00	30.00
55	40.00	35.00
60	45.00	40.00

All values in km/h

* For subject vehicle speeds between the listed values (e.g. 53 km/h), the maximum relative impact speed (i.e.40/35 km/h) assigned to the next higher relative speed (i.e. 55 km/h) shall apply.

For masses above the mass in running order, the maximum relative impact speed assigned to the maximum mass shall apply."

Paragraph 5.5.1., amend to read:

"5.5.1. The collision warning referred to in paragraphs 5.2.1.1., 5.2.2.1. and 5.2.3.1. shall be provided by at least two modes selected from acoustic, haptic or optical."

Paragraph 6.1.5., amend to read:

"6.1.5. Natural ambient illumination must be homogeneous in the test area and in excess of 1000 lux in the case of car to car scenario as stipulated in paragraph 5.2.1. and of 2000 lux in the case of car to pedestrian scenario as stipulated in paragraph 5.2.2. and of 2000 lux in the case of car to bicycle scenario as stipulated in paragraph 5.2.3. It should be ensured that testing is not performed whilst driving towards, or away from the sun at a low angle."

Insert a new paragraph 6.3.3., to read:

"6.3.3. The targets used for the bicycle detection tests shall be a "soft target" and be representative of the bicycle with an adult cyclist attributes applicable to the sensor system of the AEBS under test according to ISO 19206-4:2020."

Paragraph 6.3.3. (current), re-number as paragraph 6.3.4.

The tables in paragraph 6.7. and subparagraphs, amend to read:

"6.7. Warning and Activation Test with a Bicycle Target

6.7.1. The subject vehicle shall approach the impact point with the bicycle target in a straight line for at least two seconds prior to the functional part of the test with an anticipated subject vehicle to crankshaft of the bicycle impact point centreline offset of not more than 0.1 m.

The functional part of the test shall start when the subject vehicle is travelling at a constant speed and is at a distance corresponding to a TTC of at least 4 seconds from the collision point.

The bicycle target shall travel in a straight line perpendicular to the subject vehicle's direction of travel at a constant speed of 15 km/h +0/-1 km/h, starting not before the functional part of the test has started. During the acceleration phase of the bicycle prior to the functional part of the test the bicycle target shall be obstructed. The bicycle target's positioning shall be coordinated with the subject vehicle in such a way that the impact point of the bicycle target on the front of the subject vehicle is on the longitudinal centreline of the subject vehicle, with a tolerance of not more than 0.1 m, if the subject vehicle would

remain at the prescribed test speed throughout the functional part of the test and does not brake.

Tests shall be conducted with a vehicle travelling at speeds shown in tables below for respectively M₁ and N₁ Categories. The technical service may test any other speeds listed in the table in paragraph 5.2.3.4. and within the prescribed speed range as defined in paragraphs 5.2.3.3.

Subject vehicle test speed for M₁ category in bicycle target scenario

<i>Maximum mass</i>	<i>Mass in running order</i>	<i>Tolerance</i>
20	20	+2/-0
38	40	+0/-2
60	60	+0/-2

All values in km/h

Subject vehicle test speed for N₁ category in bicycle target scenario

<i>Maximum mass</i>	<i>Mass in running order</i>	<i>Tolerance</i>
20	20	+2/-0
36	40	+0/-2
60	60	+0/-2

All values in km/h

From the start of the functional part until the subject vehicle has avoided the collision or the subject vehicle has passed the impact point with the bicycle target there shall be no adjustment to any control of the subject vehicle by the driver other than slight adjustments to the steering control to counteract any drifting.

The test prescribed above shall be carried out with a bicycle "soft target" defined in paragraph 6.3.3.

6.7.2. The assessment of the impact speed shall be based on the actual contact point between the target and the vehicle, taking into account the vehicle shape."

Paragraph 6.10.1., amend to read:

"6.10.1. Any of the above test scenarios, where a scenario describes one test setup at one subject vehicle speed at one load condition of one category (Car to Car, Car to Pedestrian, Car to Bicycle), shall be performed two times. If one of the two test runs fails to meet the required performance, the test may be repeated once. A test scenario shall be accounted as passed if the required performance is met in two test runs. The number of failed tests runs within one category shall not exceed:

- (a) 10.0 per cent of the performed test runs for the Car to Car tests;
- (b) 10.0 per cent of the performed test runs for the Car to Pedestrian tests;
and
- (c) 20.0 per cent of the performed test runs for the Car to Bicycle tests."

Paragraph 6.10.2., amend to read:

"6.10.2. The root cause of any failed test run shall be analyzed together with the Technical Service and annexed to the test report. If the root cause cannot be linked to a deviation in the test setup, the technical service may test any other speeds within the speed range as defined in paragraphs 5.2.1.3., 5.2.1.4., 5.2.2.3., 5.2.2.4., 5.2.3.3. or 5.2.3.4. as relevant."

Paragraph 12, amend to read:

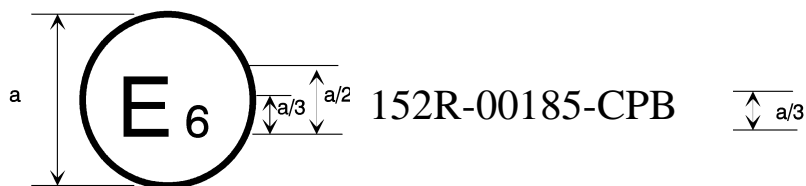
"12. Transitional provisions

- 12.1. Transitional provisions applicable to the 01 series of amendments
 - 12.1.1. 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 or refuse to accept type approvals under this Regulation as amended by the 01 series of amendments.
 - 12.1.2. As from 1 May 2024, Contracting Parties applying this Regulation shall not be obliged to accept type approvals to the original version of this Regulation, first issued after 1 May 2024.
 - 12.1.3. Until 1 May 2026, Contracting Parties applying this Regulation shall accept type approvals to the original version of this Regulation, first issued before 1 May 2024.
 - 12.1.4. As from 1 May 2026, Contracting Parties applying this Regulation shall not be obliged to accept type approvals issued to the original version of this Regulation.
 - 12.1.5. Notwithstanding paragraph 12.1.4., Contracting Parties applying this Regulation shall continue to accept type approvals issued according to the original version of this Regulation, for vehicles which are not affected by the changes introduced by the 01 Series of amendments.
- 12.2. Transitional provisions applicable to the 02 series of amendments
 - 12.2.1. As from the official date of entry into force of the 02 series of amendments, no Contracting Party applying this Regulation shall refuse to grant or refuse to accept type approvals under this Regulation as amended by the 02 series of amendments.
 - 12.2.2. As from 1 May 2024, Contracting Parties applying this Regulation shall not be obliged to accept type approvals to the preceding series of amendments of this Regulation, first issued after 1 May 2024.
 - 12.2.3. Until 1 July 2026, Contracting Parties applying this Regulation shall accept type approvals to the preceding series of this Regulation, first issued before 1 May 2024.
 - 12.2.4. As from 1 July 2026, Contracting Parties applying this Regulation shall not be obliged to accept type approvals issued to the preceding series of this Regulation.
 - 12.2.5. Notwithstanding paragraph 12.2.4., Contracting Parties applying this Regulation shall continue to accept type approvals issued according to the preceding series of amendments to this Regulation, for vehicles which are not affected by the changes introduced by the 02 series of amendments (i.e. car-to-car and/or car-to-pedestrian approvals are not affected by this new 02 series).
- 12.3. General transitional provisions
 - 12.3.1. Contracting Parties applying this Regulation may grant type approvals according to any preceding series of amendments to this Regulation or extensions thereof.
 - 12.3.2. Contracting Parties applying this Regulation shall continue to grant extensions of existing approvals to any preceding series of amendments to this Regulation."

Annex I, add a new item 10.3, to read:

"10.3. to car to bicycle scenario granted/refused/extended/withdrawn:²"

Annex 2, amend to read (addition of a letter "B" in the marking and its reference in the text):



$a = 8 \text{ mm min}$

The above approval mark affixed to a vehicle shows that the vehicle type concerned has been approved in Belgium (E 6) with regard to the Advanced Emergency Braking Systems (AEBS) pursuant to UN Regulation No. 152 (marked with C for Car to Car, P for Car to Pedestrian, B for Car to Bicycle). The first two digits of the approval number indicate that the approval was granted in accordance with the requirements of UN Regulation No. 152 in its original form."