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World Forum for Harmonization of Vehicle Regulations**Working Party on Automated/Autonomous and Connected Vehicles****Seventh session**

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Item 7 of the provisional agenda

Advanced Emergency Braking Systems**Proposal for Supplement 2 to the 01 series amendment text to
UN Regulation No. 152 (Advanced Emergency Braking
Systems for M₁ and N₁ vehicles)****Submitted by the experts from the Informal Working Group on
Advanced Emergency Braking Systems for vehicles of Categories M₁
and N₁***

The text reproduced below was prepared by the experts from the Informal Working Group on Advanced Emergency Braking Systems (AEBS) for vehicles of Categories M₁ and N₁ in order to introduce provisions for car-to-bicycle scenario as the first step of a two-step approach. Another, separate, document introduces the second step of this two-step approach. A third document proposes, as an alternative, a single step approach. The Working Party on Automated/Autonomous and Connected Vehicles (GRVA) is requested to make a decision on whether car-to-bicycle should be introduced in a single step or in a two-step approach. The modifications to the existing text of the Regulation are marked in bold for new and strikethrough for deleted characters.

* 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.



I. Proposal

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

This UN Regulation applies to the approval of vehicles of Category M₁ and N₁² 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., ~~and 5.2.2.2.~~ **and 5.2.3.2.** having the purpose of significantly decreasing the speed of the subject vehicle

Paragraphs 5.2. to 5.2.1.4., amend to read (including missing headings in the table for M₁ vehicles):

5.2. Specific Requirements

5.2.1. Car to car scenario

5.2.1.1. Collision warning

When a collision ...

5.2.1.4. Speed reduction by braking demand

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

- (a) For collisions with unobstructed and constantly travelling or stationary targets;
- (b) On flat, horizontal and dry roads;
- (c) In maximum mass and mass in running order conditions;
- (d) In situations where the vehicle longitudinal centre planes are displaced by not more than 0.2 m;
- (e) In ambient illumination conditions of at least 1000 Lux without ~~direct~~ **blinding of the sensors (e.g. direct blinding sunlight)**;
- (f) In absence of weather conditions affecting the dynamic performance of the vehicle (e.g. no storm, not below 0°C); ~~and in absence of extreme driving conditions (e.g. harsh cornering).~~

² 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

(g) When driving straight with no curve, and not turning at an intersection.

It is recognised ...

Maximum relative Impact Speed (km/h) for M₁ vehicle*

Relative Speed (km/h)	Stationary/ Moving	
	Maximum mass	Mass in running order
10	0.00	0.00
15	0.00	0.00
20	0.00	0.00
25	0.00	0.00
30	0.00	0.00
35	0.00	0.00
40	0.00	0.00
42	10.00	0.00
45	15.00	15.00
50	25.00	25.00
55	30.00	30.00
60	35.00	35.00

All values in km/h

* For relative speeds ...

Paragraphs 5.2.2 to 5.2.2.4., amend to read:

5.2.2. Car to pedestrian scenario

5.2.2.1. Collision warning

When the AEBS ...

...

5.2.2.4. Speed reduction by braking demand

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 pedestrians with a lateral speed component of not more than 5 km/h;

(b) In unambiguous situations (e.g. not multiple pedestrians);

(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 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 ~~direct~~ **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 0°C) and

~~(h) In absence of extreme driving conditions (e.g. harsh cornering).~~

(h) When driving straight with no curve, and not turning at an intersection.

It is recognised ...

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
...
60	35.00	35.00

All values in km/h

* For ~~relative~~ subject vehicle speeds between the listed values ...**Maximum Impact Speed (km/h) for N₁ vehicles***

<i>Subject vehicle speed (km/h)</i>	<i>Maximum mass</i>	<i>Mass in running order</i>
20	0.00	0.00
...
35	0.00	0.00
38	0.00	0.00
40	10.00	0.00
...
60	40.00	35.00

All values in km/h

* For 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 30 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

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 273K (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>
30	0.00	0.00
35	0.00	0.00
38	0.00	0.00
40	10.00	10.00
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>
30	0.00	0.00
35	0.00	0.00
38	15.00	0.00
40	25.00	10.00
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.

Paragraphs 5.4. to 5.4.2., amend to read:

5.4. Deactivation

5.4.1. When a vehicle ...

5.4.2. When the vehicle is equipped with a means to automatically deactivate the AEBs function, for instance in situations such as off-road use, being towed, being operated on a dynamometer, being operated in a washing plant, in case of a non-detectable misalignment of sensors, [or when the Electronic

Stability Control is switched off,] the following conditions shall apply as appropriate:”

Insert a new paragraph 5.4.4., to read:

- 5.4.4. While automated driving functions are in longitudinal control of the vehicle (e.g. ALKS is active) the AEBS function may be suspended or its control strategies (i.e. braking demand, warning timing) adapted without indication to the driver, as long as it remains ensured that the vehicle provides at least the same collision avoidance capabilities as the AEBS function during manual operation.**

Paragraph 5.5.1., amend to read:

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

Paragraphs 6.1. to 6.1.1., amend to read (including “minimum” in footnote 3):

- 6.1. Test Conditions
- 6.1.1. The test shall ...
- 6.1.1.1. The road test surface shall have a nominal³ peak braking coefficient (PBC) of **at least** 0.9. unless otherwise specified. when measured using either:

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.

Paragraphs 6.3. to 6.3.1., amend to read:

- 6.3. Test Targets
- 6.3.1. The target used for the vehicle detection tests shall be a regular high-volume series production passenger car of Category M₁ AA saloon. or alternatively a "soft target" representative of such a vehicle in terms of its identification characteristics applicable to the sensor system of the AEBS under test according to ~~ISO 19206-1:2018~~ **ISO 19206-3:2020**. The reference point for the location of the vehicle shall be the most rearward point on the centreline of the vehicle.

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.

Paragraph 6.4.1., delete the numbering and amend to read (including the addition of two tables):

- ~~6.4.1.~~ The subject vehicle ...
- Tests shall be conducted with a vehicle travelling at ~~20, 42 and 60 km/h (with a tolerance of +0/-2 km/h)~~ **speeds shown in tables below for respectively M1 and N1 Categories.** If this is deemed justified, the technical service may test

³ The "nominal" value is understood as being the **minimum** theoretical target value.”

any other speeds listed in the tables in paragraph 5.2.1.4. and within the prescribed speed range as defined in paragraph 5.2.1.3.

Subject vehicle test speed for M₁ category in stationary target scenario

<i>Maximum mass</i>	<i>Mass in running order</i>
20	20
40	42
60	60

All values in km/h with a tolerance of +0/-2 km/h

Subject vehicle test speed for N₁ category in stationary target scenario

<i>Maximum mass</i>	<i>Mass in running order</i>
20	20
38	42
60	60

All values in km/h with a tolerance of +0/-2 km/h

The functional part

Paragraph 6.5., amend to read (including the addition of two tables):

6.5. Warning and Activation Test with a Moving Vehicle Target

The subject vehicle ...

Tests shall be conducted with a vehicle travelling at ~~30 and 60 km/h~~ **speeds shown in tables below for respectively M₁ and N₁ Categories** and target travelling at 20 km/h (with a tolerance of +0/-2 km/h for both the subject and the target vehicles). If this is deemed justified, the Technical Service may test any other speeds for subject vehicle and target vehicle within the speed range as defined in paragraph 5.2.1.3.

Subject vehicle test speed for M₁ category in moving target scenario

<i>Maximum mass</i>	<i>Mass in running order</i>
30	30
60	60

All values in km/h with a tolerance of +0/-2 km/h

Subject vehicle test speed for N₁ category in moving target scenario

<i>Maximum mass</i>	<i>Mass in running order</i>
30	30
58	60

All values in km/h with a tolerance of +0/-2 km/h

The functional part

Paragraph 6.6.1., amend to read (including the addition of two tables):

6.6. Warning and Activation Test with a Pedestrian Target

6.6.1. The subject vehicle ...

Tests shall be conducted with a vehicle travelling at ~~20, 30 and 60 km/h (with a tolerance of +0/-2 km/h)~~ **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 5.2.2.4. and within the prescribed speed range as defined in paragraphs 5.2.2.3.

Subject vehicle test speed for M₁ category in pedestrian target scenario

<i>Maximum mass</i>	<i>Mass in running order</i>
20	20
40	42
60	60

All values in km/h with a tolerance of +0/-2 km/h

Subject vehicle test speed for N₁ category in pedestrian target scenario

<i>Maximum mass</i>	<i>Mass in running order</i>
20	20
38	42
60	60

All values in km/h with a tolerance of +0/-2 km/h

From the start...

Insert a new paragraph 6.7. (and subparagraphs), 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. adopted**

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 \pm 0.5 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 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>
30	30
38	38
60	60

All values in km/h with a tolerance of +0/-2 km/h

Subject vehicle test speed for N₁ category in bicycle target scenario

<i>Maximum mass</i>	<i>Mass in running order</i>
30	30
35	38
60	60

All values in km/h with a tolerance of +0/-2 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 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; ~~and~~
 - (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.**

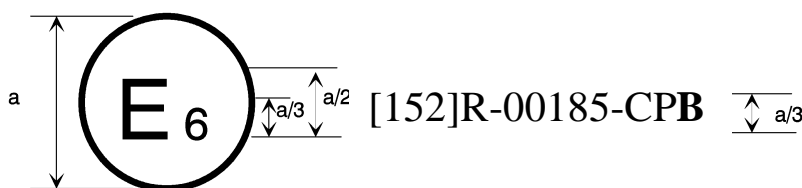
Paragraph 6.10.2., amend to read:

- 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., ~~or~~ 5.2.2.4., **5.2.3.3. or 5.2.3.4.** as relevant.

Annex 1, 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 to the Advanced Emergency Braking Systems (AEBS) pursuant to 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 Regulation No. 152 in its original form.”

Annex 3, Appendix 2

Paragraphs 1. to 3., shall be delete

Insert a new introductory paragraph, to read:

The following scenarios shall be used to assess the system’s strategies implemented in order to minimize the generation of false reactions. For each

type of scenario the vehicle manufacturer shall explain the principle strategies implemented to ensure safety.

The manufacturer shall provide evidence (e.g. simulation results, real-world test data, track test data) of the system’s behaviour in the described types of scenarios. The parameters described in subparagraph 2 of each scenario shall be used as guidance if the Technical Service deems a demonstration of the scenario necessary.

Insert new Scenarios 1 to 4, to read:

Scenario 1:

Left turn or Right turn at the intersection

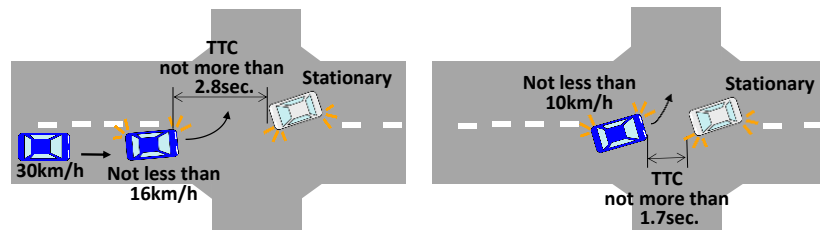
1.1. In this scenario, the subject vehicle passes by a left turn or right turn in front of an oncoming vehicle that is stopped to make a left turn or right turn at an intersection.

1.2. An example of the detail scenario:

The subject vehicle drives at a speed of 30 km/h (with a tolerance of +0/-2 km/h) toward the intersection, and decelerates by braking to a speed of not less than 16 km/h at a point where the subject vehicle begins to steer left / right, and the TTC to the oncoming vehicle is not more than 2.8 seconds. When the subject vehicle turns left or right in the intersection, the speed is reduced to not less than 10 km/h, and then drives at a constant speed. The TTC to the oncoming vehicle is not more than 1.7 seconds at when the wrap ratio between the subject vehicle and the oncoming vehicle becomes 0 per cent.

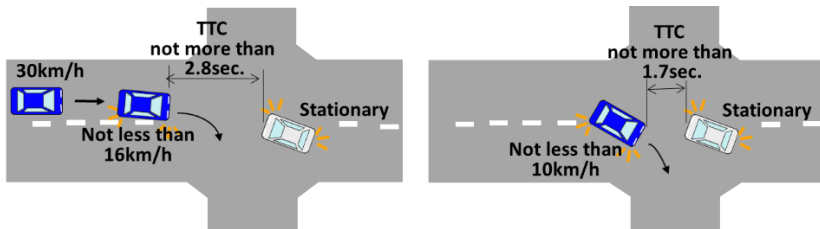
Figure 1: left turn or right turn at the intersection

(A) Driving on right side of the road



1) Beginning to steer for right turn 2) Wrap ratio 0%

(B) Driving on left side of the road



1) Beginning to steer for right turn 2) Wrap ratio 0%

Scenario 2:

Right turn or Left turn of a forward vehicle

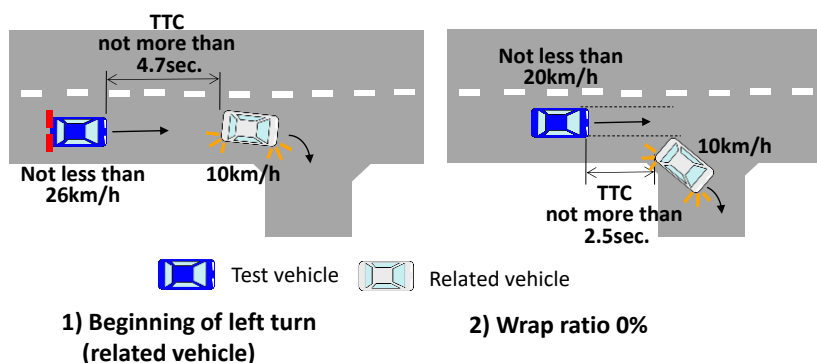
2.1. In this scenario, the subject vehicle follows a forward vehicle. After that, the forward vehicle turns right or left at a corner, and the subject vehicle goes straight.

2.2. An example of the detail scenario:

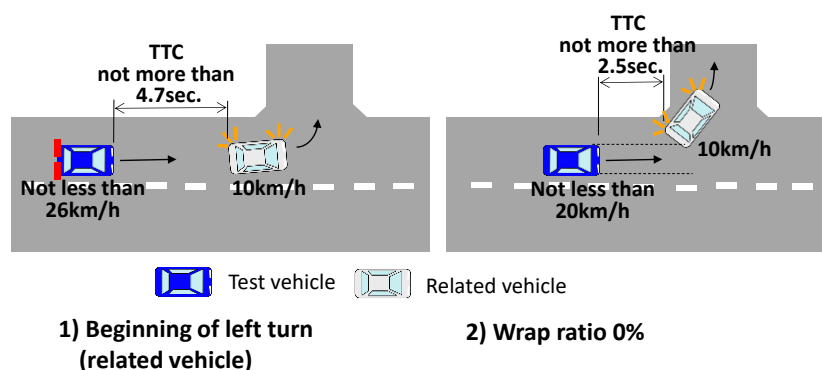
Both the forward vehicle and the subject vehicle drive at a speed of 40 km/h (with a tolerance of +0/-2 km/h) on the straight road. The forward vehicle decelerates by braking to a speed of 10 km/h (with a tolerance of +0/-2 km/h) in order to turn right or left at the corner, and the subject vehicle also decelerates by braking to keep appropriate distance with the forward vehicle. At when the forward vehicle begins to turn right or left, the speed of the subject vehicle is not less than 26 km/h and the TTC to the frontal vehicle is not more than 4.7 seconds. After that, the subject vehicle decelerates to a speed of not less than 20 km/h, and then drives at a constant speed. The TTC to the forward vehicle is not more than 2.5 seconds at when the wrap ratio between the subject vehicle and the forward vehicle becomes 0 per cent.

Figure 2: right turn or left turn of a forward vehicle

(A) Driving on right side of the road



(B) Driving on left side of the road



Scenario 3

Curved road with guard pipes and a stationary object

3.1. In this scenario, the subject vehicle drives a small radius curved road of which the guard pipes are constructed to the outer side, and a stationary vehicle (M1 category), a stationary pedestrian target or a stationary bicycle target is positioned just outside of the guard pipes and where on the extension of the centre of the lane.

3.2. An example of the detail scenario:

The subject vehicle drives at a speed of 30 (with a tolerance of +0/-2 km/h) km/h toward the curve of which the radius is not more than 25 m at the outer side of the road, and decelerates by braking to a speed of not less than 22 km/h at a point where the subject vehicle enters the curve. The TTC to the stationary object is not more than 1.6 seconds at when the subject vehicle begins to turn in the curve. In the curve, the subject vehicle drives outer lane than the centre of the road. After that, the subject vehicle continue to turn in the curve at a constant speed of not less than 21 km/h. The TTC to the stationary object is not more than 1.1 second at when the wrap ratio between the subject vehicle and the stationary vehicle becomes 0 per cent, or at when the offset ratio* between the subject vehicle and the centre of the stationary pedestrian target or the stationary bicycle target becomes 100 per cent.

Note: offset ratio between the subject vehicle and the stationary object is calculated by the following formula.

$$R_{\text{offset}} = L_{\text{offset}} / (0.5 * W_{\text{vehicle}}) * 100$$

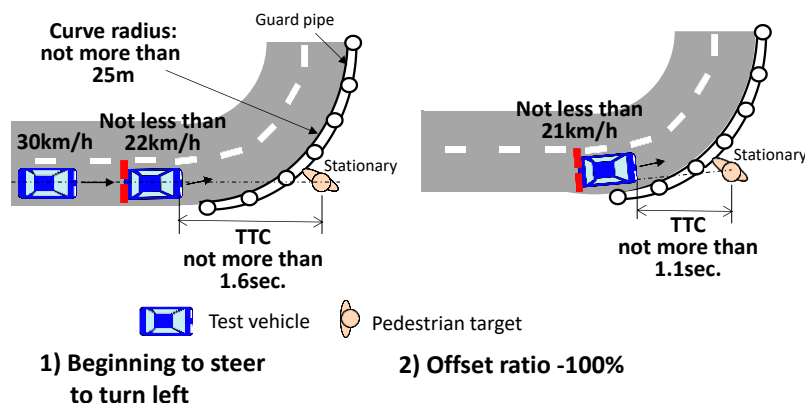
R_{offset} : Offset ratio [%]

L_{offset} : Amount of offset between the centre of the subject vehicle and the centre of the stationary object, and the direction of offset to the driver's seat side is defined as plus (+) [m]

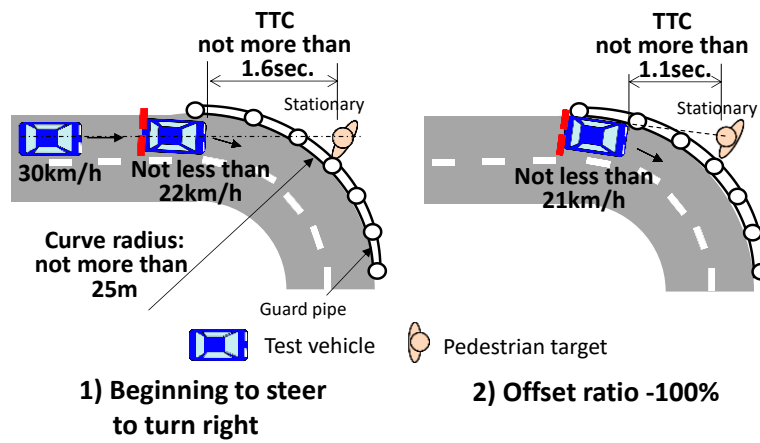
W_{vehicle} : Width of the subject vehicle [m]

Figure 3: curved road with guard pipes and a stationary object

(A) Driving on right side of the road



(B) Driving on left side of the road



Scenario 4

Lane change due to road construction

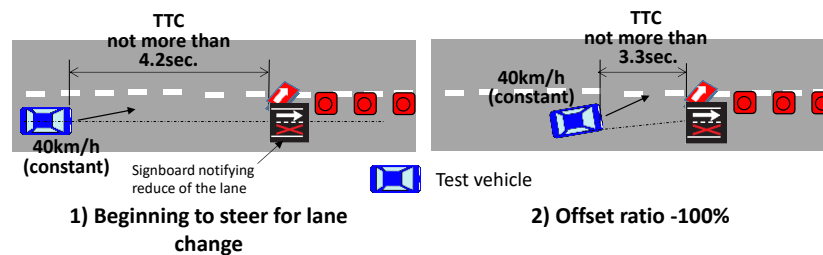
4.1. In this scenario, the subject vehicle changes the lane in front of the signboard which is positioned in the centre of the lane and notifies the driver that the lane is reduced.

4.2. An example of the detail scenario:

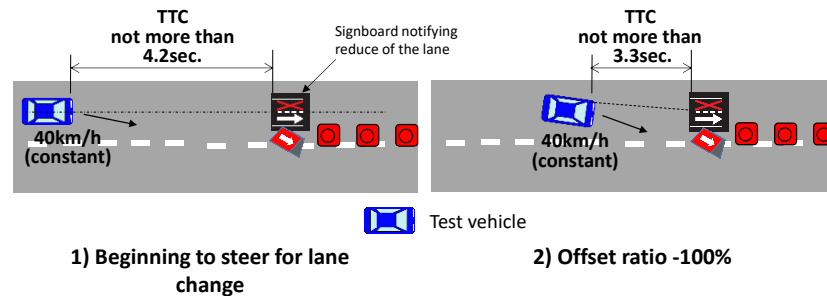
The subject vehicle drives a straight road at a speed of 40 km/h (with a tolerance of ± 2 km/h), and begins to steer in order to change the lane in front of the signboard which notifies reducing the lane. No other vehicles approach the subject vehicle. The TTC to the signboard is not more than 4.2 seconds at when the subject vehicle begins to steer. During changing the lane, the speed of the subject vehicle is constant, and the TTC to the signboard is not more than 3.3 seconds at when the offset ratio between the subject vehicle and the centre of the signboard becomes -100%.

Figure 4: lane change due to road construction

(A) Driving on right side of the road



(B) Driving on left side of the road



II. Justifications

1. The main purpose of this document is to introduce new provisions for the “car-to-bicycle” scenario as the first step of a two-step approach (see in particular paragraph 5.2.3.4.). The other proposed changes on car-to-car and car-to-pedestrian aim at aligning the text to the proposed Supplement 3 to the original text of the regulation (see justifications).
2. A separate document proposes the changes necessary to introduce the second step per a new series of amendments.
3. The application dates are as in the table below.

	<i>New Type Approvals</i>	<i>Existing Type Approvals</i>
Car-to-bicycle – step 1 (as a Suppl. 2 to the 01 Series)	Date of Entry Into Force	Shall be accepted until September 2028
Car-to-bicycle – step 2 (as a new 02 Series)	May 2024	Can be mandated as from September 2028
