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Item 6(c) of the provisional agenda

**Advanced Driver Assistance Systems and UN Regulation No. 79:
Acceleration Control for Pedal Error**

Proposal for the 01 series of amendments to UN Regulation on Acceleration Control for Pedal Error (ACPE)

**Submitted by the experts from the Informal Working Group on
Acceleration Control for Pedal Error***

The text reproduced below was prepared by the Informal Working Group on Acceleration Control for Pedal Error (ACPE).

* In accordance with the programme of work of the Inland Transport Committee for 2024 as outlined in proposed programme budget for 2024 (A/78/6 (Sect. 20), table 20.5), 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 0., amend to read:

"0. Introduction

Collisions caused

The accident data shows that pedal misapplication scenarios can vary widely from those which have been included for testing ACPE under this version of the Regulation. Therefore, a second phase ~~was is~~ looking to expand the situations where ACPE can provide benefit. These considerations ~~led to will~~ ~~ever~~ requirements and test procedures to address 'moving-off' and moving vehicle scenarios (including addressing vehicles which 'creep' when the brake control is released), pedestrian scenarios. **For inclusion of Category N₁ vehicles the situation on potential pedal misapplication is ambiguous in some regions, the contracting parties are recommended to carry out an evaluation of the necessity of the applicability for this vehicle category in their region(s).**

Equally, the regulation could be updated in a subsequent phase to accommodate secondary collisions and higher speed, both when technical feasibility is confirmed."

Paragraph 1.1., amend to read:

1.1. This UN Regulation applies to the type approval of vehicles of Category M₁¹ **[and N₁]** equipped with automatic transmission with regard to their ~~Acceleration Control for Pedal Error systems (ACPE).~~

(a) **Acceleration Control for Pedal Error systems (ACPE) for a vehicle and wall.**

(b) **ACPE for a pedestrian.**

Insert a new paragraph 1.4., to read:

[1.4 Vehicles which are intended to be fitted by a company other than the vehicle manufacturer onto incomplete N1 vehicles are exempt from the rearward relevant requirements of this Regulation.]

or

[1.4 Vehicles fitted onto incomplete vehicles are exempt from the rearward relevant requirements of this regulation.]

Insert a new paragraph 1.5., to read:

[1.5 N1 vehicle types for special purposes (e.g. on construction sites) whose shape or characteristics (e.g. angle of departure) impede the functionality or mounting of ACPE-necessary sensors, can be exempted from this regulation.]

Paragraph 2.7., amend to read:

2.7. "Obstacle" means either a vehicle, or a wall-like structure **or a pedestrian.**

Insert a new paragraph 2.10., to read:

2.10 "Extreme outer edge" on either side of the vehicle, means the plane parallel to the median longitudinal plane of the vehicle and touching its lateral outer edge, disregarding the projection:

Of tyres near their point of contact with the ground, and of connections for tyre-pressure gauges;

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

Of any anti-skid devices mounted on the wheels;

Of devices for indirect vision;

Of side direction-indicator lamps, end-outline marker lamps, front and rear position lamps, parking lamps, retro-reflectors and side-marker lamps

Insert a new paragraph 2.11., to read:

2.11 "Vehicle width" means the distance between the two vertical planes defined in paragraph 2.10.

Insert a new paragraph 2.12., to read:

2.12 "Moving off" means starting from stationary and moving forward or rearward after releasing the brakes.

Insert a new paragraph 2.13., to read:

[2.13 "Creeping" means the state of motion with any creeping speed on a horizontal surface with the powertrain engaged and operating at idle, and no acceleration or brake demand.]

or

[2.13 "Maximum Creeping Speed" means the maximum steady state speed which the vehicle achieves on a horizontal surface with the powertrain engaged and operating at idle, and no acceleration or brake demand.]

Insert a new paragraph 2.13.1., to read:

[2.13.1. "Creeping Speed" means any speed, up to steady state, the vehicle achieves whilst creeping on a horizontal surface.]

or

[2.13.1. "Creeping" means the state of motion with the powertrain engaged and operating at idle, and no acceleration or brake demand, up to the Maximum Creeping Speed.]

Paragraph 5.1.4., amend to read:

5.1.4. The ACPE shall control acceleration when the vehicle is accelerated both from standstill and, as relevant, while creeping.

An ACPE intervention is not required when there is an AEB warning or intervention occurring.

If ACPE is not ready to perform an intervention 6 s after the initiation of the vehicle powertrain, information of this status shall be indicated to the driver. This information shall exist until the system has been successfully initialised.

Insert a new paragraph 5.1.5.(b) (vi), amend to read:

5.1.5. The ACPE shall

(b) The vehicle state itself allows for the required acceleration inhibition, e.g.:

vi) If the vehicle is equipped with rear hatches, trunk lids or tailgates, they are closed and latched in the normal conditions of vehicle operation.

Insert a new (ii), (iii), (iv), (v) and (vi) in paragraph 5.1.5.(d), amend to read:

(d) The situation is unambiguous, i.e.:

(ii) ~~The lateral offset between the centreline of the obstacle and the centreline of the vehicle is not more than 0.2 m~~

(iii) ~~The direction of travel is straight with no curve, and the vehicle is not turning at an intersection and following its lane.~~

~~(iv) The obstacle is a vehicle of category M₁, or a wall like structure with a width of at least 2.0 m and a height of at least 1.0 m.~~

(ii) In the case of a vehicle obstacle, the centre line of the obstacle is located between two vertical longitudinal planes defining the extreme outer edge of the vehicle.

(iii) In the case of a wall obstacle, the overlap between wall and vehicle is at least 1.0 m.

(iv) In the case of a pedestrian obstacle, the distance between the centre line of the pedestrian obstacle and the centre line of the vehicle is not more than 25% of the vehicle width.

(v) The direction of travel is straight with no curve, and the vehicle is not turning at an intersection and following its lane.

(vi) The obstacle is a vehicle of category M₁, or a wall like structure with a width of at least 2.0 m and a height of at least 1.0 m or a silhouette of a pedestrian that relates to a human being.

Paragraph 5.1.6. and 5.1.6.1., amend to read:

[5.1.6. In case of acceleration from standstill,

In the case that a collision is not prevented, the collision speed shall be no greater than 8 km/h higher than the vehicle speed at the point where the triggering conditions specified in paragraph 5.1.2. are met.

In addition, the collision speed shall not be greater than 70% of that speed the vehicle would have had in the same position and under the same circumstances but without any ACPE intervention.

5.1.6.1. In case of acceleration from standstill,

In the case of vehicles that do not exceed 8 km/h without ACPE in the test scenarios but for which a speed reduction of 30 per cent cannot be achieved due to a low engine power to test mass ratio, the speed reduction shall be of at least 15 per cent.]

Insert a new paragraph 5.1.6.2., amend to read:

[5.1.6.2 In case of acceleration while creeping,

ACPE acceleration suppression control shall be conducted at least at the point of the 1.5m obstacle.]

or

[5.1.6.2 In case of acceleration while creeping,

ACPE acceleration suppression control shall be conducted at the point of collision or continue to be conducted after collision.]

Paragraph 5.1.12., amend to read:

5.1.12. The performance requirements shall be verified using the test procedure as described in section **6.6.1 and 6.6.2.**

Paragraph 6.3.2., amend to read:

6.3.2. Prior to any testing, it shall be ensured that the ACPE is switched on and ready to function.

During the conduct of the test the technical service need to ensure that the boundary conditions of the ACPE - as defined by the manufacturer - with regard to the detection of the test target are taken into account (e.g. avoid blocking of a sonar system used, ensure that a vision system used can properly identify the pedestrian test target used as a human by making it fully visible to the camera system before testing, etc.)

Insert a new paragraph 6.4.2., amend to read:

- 6.4.2. The targets used for the pedestrian detection tests shall be a child articulated "soft target" in its resting position with the articulation being switched off and be representative of the human attributes applicable to the sensor system of the ACPE under test according to ISO 19206-2:2018.**

Insert a new paragraph 6.5. and 6.5.1. to 6.5.5., amend to read

(and re-number the following paragraphs)

- 6.5. Offset of vehicle and target**
- 6.5.1 The reference point for the location of the vehicle shall be the most rearward point on the centreline of the vehicle when going rearwards, and the most forward point of the vehicle when going forwards.**
- 6.5.2 The lateral offset between the centreline of the vehicle target and the centreline of the vehicle shall be between 0.0 m and the distance to extreme outer edge of the vehicle.**
- 6.5.3 The lateral offset between the centre line of the pedestrian obstacle and the centre line of the vehicle is not more than 25% of the vehicle width.**
- 6.5.4. The orientation of the pedestrian target is to be determined by the technical service.**
- 6.5.5. The orientation of the vehicle target shall be 0° or 180° respectively as defined in ISO 19206-3:2021, chosen by the technical service.**

Paragraph 6.6. and 6.6.1., amend to read:

- 6.6. Test procedures ~~Accelerator control misapplication test~~**

The test procedures shall be performed with and without an ACPE intervention both in a forward and rearward direction and at least with the **ACPE interventions triggered in vehicle-situated** 1.0 m (+0.1 m tolerance) and 1.5 m (-0.1 m tolerance) **distance** from the target position at the start of the test (as detailed in Table 1).

Table 1
Test conditions

Driving direction	Distance to target /		Tolerance on the longitudinal distance (m)	Tolerance on the lateral (offset) distance (m)	Presence of target
	Distance to speed measuring point (m)				
Forward	1.0		+ 0.1	+/- 0.2	Yes
Forward	1.0		+ 0.1	N/A	No *
Forward	1.5		-0.1	+/- 0.2	Yes
Forward	1.5		-0.1	N/A	No *
Rearward	1.0		+ 0.1	+/- 0.2	Yes
Rearward	1.0		+ 0.1	N/A	No **
Rearward	1.5		-0.1	+/- 0.2	Yes
Rearward	1.5		-0.1	N/A	No **

Presence of target:

Yes : with ACPE intervention

No : without ACPE intervention or with ACPE deactivation

* These tests may be combined

** These tests may be combined

The procedure for each test shall be as follows:

- (a) Position the vehicle at a distance to the target or speed measurement point as defined in Table 1.
- (b) Hold the vehicle stationary and select the corresponding driving direction.
- (c) Accelerate the vehicle, whilst maintaining the steering control in the neutral position, by operating the accelerator control in order to achieve the relevant triggering conditions (as outlined in paragraph 5.1.2.) before the vehicle reaches a speed of 0.5 km/h.
- (d) Record the speed at the collision point (if applicable) or the speed at the respective speed measurement point.

~~Before any test is started the vehicle may be driven in the direction of the target for a distance of up to 20 m to the start position and/or the engine may be switched “off” and “on”, if requested by the manufacturer.~~

6.6.1. The procedure for each test **with a stationary (non creeping) vehicle** shall be as follows:

- (a) Position the vehicle at a distance to the target or speed measurement point as defined in Table 1.
- (b) Hold the vehicle stationary and select the corresponding driving direction.
- (c) Accelerate the vehicle, whilst maintaining the steering control in the neutral position, by operating the accelerator control in order to achieve the relevant triggering conditions (as outlined in paragraph 5.1.2.) before the vehicle reaches a speed of 0.5 km/h.
- (d) Record the speed at the collision point (if applicable) or the speed at the respective speed measurement point.

Insert a new paragraph 6.6.2., amend to read:

6.6.2. Test procedure for a creeping vehicle

Each test condition according to Table 1 shall be tested once with a starting point selected at the discretion of the Technical Service. The starting point shall be selected such that an ACPE intervention is expected, and aiming for a creeping speed as high as reasonably practical whilst avoiding ACPE suppression due to an AEBS intervention.

The recorded creeping speeds with and without the presence of a target (according to subbullet (e)) shall not deviate by more than [0,x] km/h in order to assess the test as valid.

- (a) Position the vehicle at an appropriate distance to reach a creeping speed at the relevant distance to target / distance to speed measuring point according to Table 1.**
- (b) Hold the vehicle stationary and select the corresponding driving direction.**
- (c) Release the braking system so that the vehicle starts creeping.**
- (d) Operate the accelerator control in order to achieve the relevant triggering conditions (as outlined in paragraph 5.1.2.) once the vehicle has reached the distance to target / the speed measurement point.**
- (e) Record the creeping speed at the triggering point of the ACPE (as outlined in paragraph 5.1.2.) and the speed at the collision point (if applicable) or the speed at the respective speed measurement point.**

Paragraph 6.7., amend to read:

- 6.7. If this is deemed justified, the Technical Service may test in any test condition within the conditions specified in paragraph 5.1. during the tests as described in paragraph 6.6.5., e.g. testing a creeping vehicle also according to section 6.6.1.

Insert a new paragraph 12., amend to read:

12. Transitional provisions

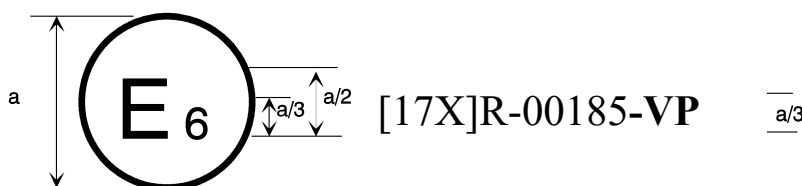
- 12.1. Transitional provisions applicable to the 01 series of amendments
- 12.1.1. As from the official date of entry into force of the 01 series of amendments, no Contracting Party applying this Regulation shall refuse to grant or refuse to accept type approvals under this Regulation as amended by the 01 series of amendments.
- 12.1.2. As from 1 September [2028 / 2029 / 2030], Contracting Parties applying this Regulation shall not be obliged to accept type approvals to the original version of this Regulation, first issued after 1 September [2028 / 2029 / 2030].
- 12.1.3. Until 1 September [2030 / 2031 / 2032], Contracting Parties applying this Regulation shall accept type approvals to the original version of this Regulation, first issued before 1 September [2028 / 2029 / 2030].
- 12.1.4. As from 1 September [2030 / 2031 / 2032], 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.
- 12.1.6. Notwithstanding the transitional provisions above, Contracting Parties who start to apply this Regulation after the date of entry into force of the most recent series of amendments are not obliged to accept type approvals which were granted in accordance with any of the preceding series of amendments to this Regulation.
- 12.1.7. Contracting Parties applying this Regulation may grant type approvals according to any preceding series of amendments to this Regulation.
- 12.1.8. Contracting Parties applying this Regulation shall continue to grant extensions of existing approvals to any preceding series of amendments to this Regulation.

Annex 1, add a new item 11.1 and 11.2, to read:

11.1 to ACPE for a vehicle and wall granted/refused/extended/withdrawn:²

11.2 to ACPE for a pedestrian granted/refused/extended/withdrawn:²

Annex 2, amend to read (addition of a letter "VP" 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 Acceleration Control for Pedal Error (ACPE) pursuant to UN Regulation No. [17X] (marked with V for Vehicle and Wall. P

for Pedestrian). The first two digits of the approval number indicate that the approval was granted in accordance with the requirements of UN Regulation No. [17X] in its original form.
