

Proposal for amendments to UN Regulations prepared by the Task Force on FADS

The text reproduced below was prepared by the GRVA task force on regulatory fitness for ADS (TF FADS) to enable the application of the UN Regulations to vehicles equipped with an Automated Driving System.

Modifications to the text of the Regulations are indicated in **bold** for new characters and ~~strike through~~ for deleted characters.

I. UN Regulation No. 89

Paragraph 1.1.1., footnote 1, amend to read:

¹ As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.),
(~~TRANS/WP.29/78/Rev.1/Amend.2.~~) **document ECE/TRANS/WP.29/78/Rev.8 -**
<https://unece.org/transport/vehicle-regulations/wp29/resolutions>

Paragraph 1.1.1., amend to read:

- 1.1.1. Part I: Vehicles of categories¹ M₂, M₃, N₂ and N₃² equipped with an SLD **or SLF** and to vehicles of categories M and N equipped with an adjustable speed limitation device (**ASLD**) **or function (ASLF)** which have not been separately approved according to Part III of this Regulation, or to vehicles so designed and/or equipped that their component parts can be regarded as totally or partially fulfilling the function of an SLD, SLF, ~~or ASLD or ASLF~~ **or ASLF**, as appropriate.

Paragraph 2.1.1., amend to read:

- "2.1.1. "Limitation speed V" means the maximum speed of the vehicle such that its design or equipment does not permit a response **for an acceleration demand** ~~after a positive action on the accelerator control by the driver.~~"

Paragraph 5.1.4., amend to read:

- "5.1.4. The speed limitation function must be such that it does not affect the vehicle's road speed if ~~an positive action on the accelerator~~ **acceleration demand** is applied by the driver **or ADS** when the vehicle is running at its set speed."

Paragraph 5.1.6., amend to read:

- "5.1.6. No malfunction or unauthorised interference shall result in an increase in engine power above that demanded by ~~the position of the driver's accelerator~~ **or ADS.**"

Paragraph 5.1.7., amend to read:

- "5.1.7. The speed limitation function shall be obtained regardless of the accelerator control used if there is more than one such control which may be reached from the driver's seating position, **or regardless of any form of demand by the ADS.**"

Insert new paragraph 5.1.11., to read:

- 5.1.11. **At the request of the manufacturer, vehicles of categories X and Y may be considered to be equipped with an SLF if the ADS [is capable to limit the vehicle speed to a fixed maximum value].**

Such an SLF shall be considered to fulfil the requirements of paragraphs 5.1. and 5.3. of this regulation if the ADS complies with the technical

requirements and respects the transitional provisions of UN Regulation Nos. [ADS] and 155, including verification of this maximum speed.

The limitation speed (V) according to this UN Regulation is deemed to be the maximum speed of the ADS.

Paragraph 5.2.7.1., amend to read:

"5.2.7.1. The ASLF must be capable of being activated/de-activated at any time, **except whilst an ADS feature is active.**"

Insert new Paragraphs 5.2.7.4. and 5.2.7.5.:

"5.2.7.4. The ASLF shall be deactivated when an ADS feature is activated. It shall not be possible to activate the ASLF whilst an ADS feature is active.

[5.2.7.5. The ASLF may be automatically reactivated when an ADS feature is no longer active.]"

Paragraph 13.1.3., amend to read:

"13.1.3. The speed limitation function shall be obtained regardless of the accelerator control used if there is more than one such control which may be reached from the driver's seating position, **or regardless of any form of demand by the ADS.**"

Paragraph 21.1.4., amend to read:

"21.1.4. The SLD must be such that it does not affect the vehicle's road speed if ~~an positive action on the accelerator~~ **acceleration demand** is applied by the driver **or ADS** when the vehicle is running at its set speed."

Paragraph 21.1.6., amend to read:

"21.1.6. No malfunction or unauthorised interference shall result in an increase in engine power above that demanded by ~~the position of the driver's accelerator~~ **or ADS.**"

Paragraph 21.2.7.2., amend to read:

"21.2.7.2. The ASLD must be capable of being activated/de-activated at any time, **except whilst an ADS feature is active.**"

Insert new paragraph 21.2.7.4., to read:

"21.2.7.4. The ASLD shall be deactivated when an ADS Feature is activated. It shall not be possible to activate the ASLD whilst an ADS Feature is active.

[21.2.7.5. The ASLD may be automatically reactivated when an ADS feature is no longer active.]"

Annex 5, paragraph 1., amend to read:

"1. Tests of speed limitation

At the request of the applicant for approval, tests shall be made in accordance with either paragraphs 1.1., 1.2. or 1.3. below.

For vehicles of categories X and Y, all tests in this annex shall be conducted, and all respective requirements shall be fulfilled. In the absence of manual driving controls, tests shall be conducted using dedicated activation methods, which may include:

(a) A test mode allowing to manually control or trigger the acceleration functions, or

(b) Any other method subject to agreement between the vehicle manufacturer and the technical service, ensuring that the evaluation accurately reflects real-world ADS performance.

Wherever this annex details a manual control being actuated or an action being applied on it, that shall be understood as an acceleration demand being made through the selected activation method above. The manufacturer shall demonstrate that the test activation method accurately replicates ADS performance, and a detailed description of the method used shall be included in the test report. The acceleration demand made shall be recorded in the test report alongside the results of each test.

For vehicles equipped with an ADS, other than those of categories X and Y, the tests in this annex shall be performed at least in the manual driving mode. Tests do not have to be performed in ADS mode providing the manufacturer can demonstrate to the technical service that the same SLD performance can be achieved when acceleration demands are made by the ADS. However, testing to verify this shall be performed at the request of the technical service."

II. UN Regulation No. 89

Paragraph 1.1.1., insert a new footnote 7, to read:

- "1.1.1. Replacement brake lining assemblies intended for use in friction brakes forming part of a braking system of vehicles of category M, N, L and O⁷ which have a type approval in accordance with Regulations Nos. 13, 13-H or 78.

⁷ As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.8, <https://unece.org/transport/vehicle-regulations/wp29/resolutions>."

Footnote 4, amend to read:

⁴ The distinguish numbers of the Contracting Parties to the 1958 Agreement are reproduced in Annex 3 to Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.82/Amend.1.

Annex 3, paragraph 1., amend to read:

- "1. Conformance with Regulation No. 13 or 13-H
Compliance with the requirements of Regulation No. 13 or 13-H shall be demonstrated in a vehicle test.

Special provisions for vehicles equipped with an ADS:

For vehicles of categories X and Y, all tests in this annex shall be conducted, and all respective requirements shall be fulfilled. In the absence of manual driving controls, braking tests shall be conducted using dedicated activation methods, which may include:

- (a) A test mode allowing to manually control or trigger the braking functions, or
- (b) Any other method subject to agreement between the vehicle manufacturer and the technical service, ensuring that the evaluation accurately reflects real-world ADS braking performance.

Wherever this annex details pedal effort or line pressure being applied, that shall be understood as a braking demand being made through the selected activation method above. The manufacturer shall demonstrate that the test activation method accurately replicates ADS braking performance, and a detailed description of the method used shall be included in the test report. The braking demand made shall be recorded in the test report alongside the results of each test.

For vehicles of categories X and Y, wherever this annex details initial speeds for brake applications, 90 per cent of $v_{\max}$ shall not be exceeded. Appropriate additional initial speed values reflecting real world ADS operation may be chosen subject to agreement between the manufacturer and the technical service before testing.

For vehicles equipped with an ADS, other than those of categories X and Y, the tests in this annex shall be performed at least in the manual driving mode. Tests do not have to be performed in ADS mode providing the manufacturer can demonstrate to the technical service that the same braking performance can be achieved when braking demands are made by the ADS. However, testing to verify this shall be performed at the request of the technical service."

Annex 3, paragraph 1.1.2.3., amend to read:

"1.1.2.3. Performance check

By braking only one axle at a time perform 5 brake applications from 70 km/h to 0 km/h (front axle) and 45 km/h to 0 km/h (rear axle) at a line pressure of 4 MPa¹ and with an initial temperature of 100 °C for each stop. The 5 consecutive non-monotonic results must remain within the tolerance of 0.6 m/s² (front axle) or 0.4 m/s² (rear axle) of their mean fully developed deceleration. **It shall be ensured that the line pressure¹ measured reflects the actual force applied by the brake actuator(s), and is not affected by any compensation or other demand modification made by the braking system.**

If this requirement is not fulfilled the bedding procedure according to paragraph 1.1.2.2. must be extended and the performance check according to paragraph 1.1.2.3. must be repeated."

Annex 4, paragraph 1., amend to read:

"1. Vehicle test

For vehicles of categories X and Y, all tests in this annex shall be conducted, and all respective requirements shall be fulfilled. In the absence of manual driving controls, braking tests shall be conducted using dedicated activation methods, which may include:

- (a) A test mode allowing to manually control or trigger the braking functions, or**
- (b) Any other method subject to agreement between the vehicle manufacturer and the technical service, ensuring that the evaluation accurately reflects real-world ADS braking performance.**

Wherever this annex details pedal effort, control force or line pressure being applied, that shall be understood as a braking demand being made through the selected activation method above. The manufacturer shall demonstrate that the test activation method accurately replicates ADS braking performance, and a detailed description of the method used shall be included in the test report. The braking demand made shall be recorded in the test report alongside the results of each test.

For vehicles of categories X and Y, wherever this annex details initial speeds for brake applications, 90 per cent of $v_{\max}$ shall not be exceeded. Appropriate additional initial speed values reflecting real world ADS operation may be chosen subject to agreement between the manufacturer and the technical service before testing.

For vehicles equipped with an ADS, other than those of categories X and Y, the tests in this annex shall be performed at least in the manual driving mode. Tests do not have to be performed in ADS mode providing the manufacturer can demonstrate to the technical service that the same

braking performance can be achieved when braking demands are made by the ADS. However, testing to verify this shall be performed at the request of the technical service."

Annex 7, paragraph 1., amend to read:

"1. Test conditions

For vehicles of categories X and Y, all tests in this annex shall be conducted, and all respective requirements shall be fulfilled. In the absence of manual driving controls, braking tests shall be conducted using dedicated activation methods, which may include:

(a) A test mode allowing to manually control or trigger the braking functions, or

(b) Any other method subject to agreement between the vehicle manufacturer and the technical service, ensuring that the evaluation accurately reflects real-world ADS braking performance.

Wherever this annex details brake control actuation, brake application, pedal effort or line pressure being applied, that shall be understood as a braking demand being made through the selected activation method above. The manufacturer shall demonstrate that the test activation method accurately replicates ADS braking performance, and a detailed description of the method used shall be included in the test report. The braking demand made shall be recorded in the test report alongside the results of each test.

For vehicles of categories X and Y, wherever this annex details initial speeds for brake applications, 90 per cent of v_{max} shall not be exceeded. Appropriate additional initial speed values reflecting real world ADS operation may be chosen subject to agreement between the manufacturer and the technical service before testing.

For vehicles equipped with an ADS, other than those of categories X and Y, the tests in this annex shall be performed at least in the manual driving mode. Tests do not have to be performed in ADS mode providing the manufacturer can demonstrate to the technical service that the same braking performance can be achieved when braking demands are made by the ADS. However, testing to verify this shall be performed at the request of the technical service."

Annex 11, paragraph 1., amend to read:

"1. Test overview

For vehicles of categories X and Y, all tests in this annex shall be conducted, and all respective requirements shall be fulfilled. In the absence of manual driving controls, braking tests shall be conducted using dedicated activation methods, which may include:

(a) A test mode allowing to manually control or trigger the braking functions, or

(b) Any other method subject to agreement between the vehicle manufacturer and the technical service, ensuring that the evaluation accurately reflects real-world ADS braking performance.

Wherever this annex details control forces, brake actuation or brake pressure being applied, that shall be understood as a braking demand being made through the selected activation method above. The manufacturer shall demonstrate that the test activation method accurately replicates ADS braking performance, and a detailed description of the method used shall be included in the test report. The

braking demand made shall be recorded in the test report alongside the results of each test.

For vehicles of categories X and Y, wherever this annex details initial speeds for brake applications, 90 per cent of $v_{\max}$ shall not be exceeded. Appropriate additional initial speed values reflecting real world ADS operation may be chosen subject to agreement between the manufacturer and the technical service before testing.

For vehicles equipped with an ADS, other than those of categories X and Y, the tests in this annex shall be performed at least in the manual driving mode. Tests do not have to be performed in ADS mode providing the manufacturer can demonstrate to the technical service that the same braking performance can be achieved when braking demands are made by the ADS. However, testing to verify this shall be performed at the request of the technical service."

The tests required in paragraph 5.3. of this Regulation are detailed as follows according to the vehicle category:

Table A11/1A

Vehicles of categories M₁, N₁

..."

Annex 14, paragraph 1., amend to read:

"1. Test overview

For vehicles of categories X and Y, all tests in this annex shall be conducted, and all respective requirements shall be fulfilled. In the absence of manual driving controls, braking tests shall be conducted using dedicated activation methods, which may include:

(a) A test mode allowing to manually control or trigger the braking functions, or

(b) Any other method subject to agreement between the vehicle manufacturer and the technical service, ensuring that the evaluation accurately reflects real-world ADS braking performance.

Wherever this annex details control forces, brake application or brake pressure being applied, that shall be understood as a braking demand being made through the selected activation method above. The manufacturer shall demonstrate that the test activation method accurately replicates ADS braking performance, and a detailed description of the method used shall be included in the test report. The braking demand made shall be recorded in the test report alongside the results of each test.

For vehicles of categories X and Y, wherever this annex details initial speeds for brake applications, 90 per cent of $v_{\max}$ shall not be exceeded. Appropriate additional initial speed values reflecting real world ADS operation may be chosen subject to agreement between the manufacturer and the technical service before testing.

For vehicles equipped with an ADS, other than those of categories X and Y, the tests in this annex shall be performed at least in the manual driving mode. Tests do not have to be performed in ADS mode providing the manufacturer can demonstrate to the technical service that the same braking performance can be achieved when braking demands are made by the ADS. However, testing to verify this shall be performed at the request of the technical service."

The tests required in paragraph 5.3. of this Regulation are detailed as follows according to the vehicle category:

III. Proposal for supplement 1 to the 01 series of amendments of UN Regulation No. 130 (Lane Departure Warning Systems)

A. Amendments proposal

Insert a new paragraph at the end of the introduction to read:

...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 to the extent that they encourage the driver to switch the system off.

For supplement 1 to the 01 series of amendments, the regulation is amended to account for vehicles of category X and Y. Recognizing the need for different arrangements for vehicles fitted with Automated Driving Systems (ADS¹), this regulation has been amended to clarify that LDWS are only required to operate when a driver is in control, and that vehicles without the ability to be controlled by a driver (vehicles of category X and Y) are not required to comply with this regulation. These changes are made based on the assumption that ADS vehicles must have good perception of the edges of the driving lane and be able to maintain the vehicle within the lane. In the case of vehicles equipped with an ADS other than vehicles of categories X and Y, in the manual driving mode no special provisions or exemptions apply.

Footnote 1, amend to read:

¹ As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.48, ~~para. 2 -~~
~~www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html~~<https://unece.org/transport/vehicle-regulations/wp29/resolutions>"

Paragraph 1, amend to read:

1. Scope

This Regulation applies to the lane departure warning system of vehicles of categories M₂, N₂, M₃ and N₃.²

It does not apply to vehicles of categories X and Y².

Footnote 2, amend to read:

² As defined in ~~section 2 of~~ the Consolidated Resolution on the Construction of Vehicles (R.E.3.), (document ECE/TRANS/WP.29/78/Rev. ~~82, para. 2~~) -
~~www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html~~<https://unece.org/transport/vehicle-regulations/wp29/resolutions>

Footnote 3, amend to read:

³ The distinguishing numbers of the Contracting Parties to the 1958 Agreement are reproduced in Annex 3 to the Consolidated Resolution on the Construction of Vehicles (R.E.3), document ECE/TRANS/WP.29/78/Rev. ~~82/Amend.3~~ -
~~www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html~~<https://unece.org/transport/vehicle-regulations/wp29/resolutions>

Insert new paragraph 5.6. and subparagraphs, to read:

"5.6. Special provisions for vehicles equipped with an ADS²

5.6.1. The LDWS shall be automatically deactivated whilst an ADS feature is active.

- 5.6.2. The LDWS shall be automatically reactivated upon deactivation of an ADS feature.
- 5.6.3. The provisions of paragraph 5.3. above do not apply whilst an ADS feature is active."

B. Justification

1. LDWS is a driver assistance feature and therefore has no role whilst an ADS is performing the DDT.
2. For this reason, this regulation is not applicable for vehicles of categories X and Y (i.e. with a manual driving capability only below 6 km/h)
3. It is also proposed to add three new provisions to ensure:
 - (a) The LDWS is disabled whenever an ADS feature is active (i.e. whilst the ADS is performing the DDT)
 - (b) The LDWS is re-enabled when the ADS feature is deactivated (i.e. when a driver has taken over performance of the DDT)
 - (c) The warning normally given to inform the driver that LDWS has been switched off is not required when the ADS is performing the DDT.
4. In the case that one ADS feature is deactivated at the same time as another ADS feature is activated (i.e. a transition directly between ADS features), 5.6.1. takes precedent and it is not expected to re-enable LDWS in this case.
5. It should be understood that the term 'ADS Feature' includes ALKS.

IV. Proposal for a supplement to the 02 series of amendments of UN Regulation No. 131 on Advanced Emergency Braking Systems (AEBS)

A. Amendments proposal

Paragraph 1, amend to read:

1. Scope
 This Regulation applies to the approval* of vehicles of Category M₂, N₂, M₃ and N₃¹ with regard to an on-board system to:
 - (a) Avoid or mitigate the severity of a rear-end in lane collision with a preceding vehicle,
 - (b) Avoid or mitigate the severity of an impact with a pedestrian.**It does not apply to vehicles of categories X and Y¹.**

Footnote 1, amend to read:

¹ As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.68, para. 2 –
~~<https://unece.org/transport/vehicle-regulations/wp29/resolutions>~~
<https://unece.org/transport/vehicle-regulations/wp29/resolutions>

Paragraph 5.4.5., amend to read:

- "5.4.5. ~~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. Special provisions for vehicles equipped with an ADS¹"~~

Insert new paragraphs 5.4.5.1 to 5.4.5.3, to read:

- 5.4.5.1. The AEBS shall be automatically deactivated whilst an ADS feature is active.**
- 5.4.5.2. The AEBS shall be automatically reactivated upon deactivation of an ADS feature.**
- 5.4.5.3. The provisions of paragraph 5.4.4. do not apply whilst an ADS feature is active.**

B. Justification

1. The existing text of para. 5.4.5. was previously added to address the compatibility of AEBS with ADS (in particular ALKS). Since that time, understanding of ADS has developed and it is no longer deemed appropriate to suggest that the ‘collision avoidance capabilities’ of an ADS should be compared to those of an AEBS, since an ADS is expected to perform with at least the safety level of a competent and careful human driver throughout its ODD, whilst AEBS has limited performance expectations which are only expected to be fully met within the boundary conditions specified in the regulation.
2. AEBS is a driver assistance feature and therefore has no role whilst an ADS is performing the DDT.
3. Therefore, it is proposed to replace the existing provision with three new provisions to ensure:
 - (a) The AEBS is disabled whenever an ADS feature is active (i.e. whilst the ADS is performing the DDT)
 - (b) The AEBS is re-enabled when the ADS feature is deactivated (i.e. when a driver has taken over performance of the DDT)
 - (c) The warning normally given to inform the driver that AEBS has been switched off is not required when the ADS is performing the DDT.
4. In the case that one ADS feature is deactivated at the same time as another ADS feature is activated (i.e. a transition directly between ADS features), 5.4.5.1. takes precedent and it is not expected to re-enable AEBS in this case.
5. It should be understood that the term ‘ADS Feature’ includes ALKS.

V. Proposal for supplement 3 to UN Regulation No. 139 (Brake Assist Systems)

A. Amendments proposal

Insert a new paragraph 1.2.3., to read:

"1.2.3. Vehicles of categories X and Y¹."

Paragraph 1 footnote 1, amend to read:

¹ ~~M₁ and N₁ categories of vehicles are~~ As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.48, para. 2 - www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html ~~h~~ <https://unece.org/transport/vehicle-regulations/wp29/resolutions>

Paragraph 4.4.1., footnote 3, amend to read:

³ The distinguishing numbers of the Contracting Parties to the 1958 Agreement are reproduced in Annex 3 to the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.48
~~www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html~~
<https://unece.org/transport/vehicle-regulations/wp29/resolutions>

Insert new paragraph 5.7, to read:

- 5.7. Whilst an ADS feature is active, the BAS shall not influence the performance of the braking system.**

B. Justification

1. BAS is a driver assistance feature and therefore has no role whilst an ADS is performing the DDT.
2. For this reason, this regulation is not applicable for vehicles of categories X and Y (i.e. with a manual driving capability only below 6 km/h)
3. It is also proposed to add a new provision to ensure the BAS is not influencing the braking system performance whenever an ADS feature is active (i.e. whilst the ADS is performing the DDT).
4. Recognizing that both categories of BAS defined in this regulation rely on driver input for their activation, such a change may not be necessary – however if an ADS causes the movement of a brake pedal, this amendment will ensure that such movement does not influence the brake performance.
5. It should be understood that the term ‘ADS Feature’ includes ALKS.

VI. Proposal

Footnote 1, amend to read:

¹ ~~M1 and N1 categories of vehicles are~~ As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev. 48, ~~para. 2. ~~www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html~~~~
<https://unece.org/transport/vehicle-regulations/wp29/resolutions>

Paragraphs 2.7.1. and 2.7.2., amend to read:

- "2.7.1. That improves vehicle directional stability by at least having the ability to automatically control individually the braking torques of the left and right wheels on each axle¹ to induce a correcting yaw moment based on the evaluation of actual vehicle behaviour in comparison with a determination of vehicle behaviour demanded by the driver **or the ADS¹ (as applicable)**;
- 2.7.2. That is computer controlled with the computer using a closed-loop algorithm to limit vehicle oversteer and to limit vehicle understeer based on the evaluation of actual vehicle behaviour in comparison with a determination of vehicle behaviour demanded by the driver **or the ADS (as applicable)**;"

Paragraphs 2.7.4. and 2.7.5., amend to read:

- "2.7.4. That has a means to monitor driver-steering demand **by the driver or the ADS (as applicable)** and
- 2.7.5. That has an algorithm to determine the need, and a means to modify propulsion torque, as necessary, to assist ~~the driver~~ in maintaining control of the vehicle."

Footnote 3, amend to read:

³ The distinguishing numbers of the Contracting Parties to the 1958 Agreement are reproduced in Annex 3 to the Consolidated Resolution on the Construction of Vehicles (R.E.3), document ECE/TRANS/WP.29/78/Rev. 48, Annex 3 - ~~www.unecce.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html~~ <https://unecce.org/transport/vehicle-regulations/wp29/resolutions>

Paragraph 5.6.1., amend to read:

- 5.6.1. It shall be possible at a periodic technical inspection to confirm the correct operational status by visual observation of the warning signals following a power-on sequence.

Alternatively, in the case of categories X and Y¹ suitable means shall be provided to enable the confirmation of the correct operational status of the system.

Paragraphs 6.2. and 6.2.1., amend to read:

- 6.2. Is operational over the full speed range of the vehicle, during all phases of driving including acceleration, coasting, and deceleration (including braking), **and whilst an ADS feature is active**, except:
- 6.2.1. When the driver **or the ADS (as applicable)** has disabled ESC;

Paragraph 7.4., amend to read:

- 7.4. ESC malfunction detection

The vehicle shall be equipped with a tell-tale that provides a warning to the driver of the occurrence of any malfunction that affects the generation or transmission of control or response signals in the vehicle's electronic stability control system.

The requirements of this section related to warning signals to the driver do not apply whilst an ADS feature is active. The following requirement shall apply instead:

Whilst an ADS feature is active, warning signals (e.g. failure status) shall be transmitted to the ADS according to the provisions specified for the tell-tales. The means by which it is ensured that existing detected faults are transmitted to the ADS before an ADS feature becomes active (e.g. previously detected faults which remain present) shall be documented by the manufacturer.

Paragraphs 7.5.1. to 7.5.1.2., amend to read:

- 7.5.1. The vehicle's ESC system shall always return to the manufacturer's original default mode that satisfies the requirements of paragraphs 6. and 7. at the initiation of each new ignition cycle, regardless of what mode the driver **or the ADS** had previously selected. However, the vehicle's ESC system need not return to a mode that satisfies the requirements of paragraphs 7. through 7.3. at the initiation of each new ignition cycle if:
- 7.5.1.1. The vehicle is in a four-wheel drive configuration which has the effect of locking the drive gears at the front and rear axles together and providing an additional gear reduction between the engine speed and vehicle speed of at least 1.6, selected by the driver **or the ADS** for low-speed, off-road driving; or
- 7.5.1.2. The vehicle is in a four-wheel drive configuration selected by the driver **or the ADS** that is designed for operation at higher speeds on snow-, sand-, or dirt-packed roads and that has the effect of locking the drive gears at the front and rear axles together, provided that in this mode the vehicle meets the stability performance requirements of paragraphs 7.1. and 7.2. under the test conditions specified in paragraph 8. However, if the system has more than one ESC mode that satisfies the requirements of paragraphs 7.1. and 7.2. within the drive configuration selected for the previous ignition cycle, the ESC shall return to

the manufacturer's original default ESC mode for that drive configuration at the initiation of each new ignition cycle."

Paragraph 7.6., amend to read:

7.6. ESC Off tell-tale

If the manufacturer elects to install a control to turn off or reduce the performance of the ESC system under paragraph 7.5., the tell-tale requirements of paragraphs 7.6.1. to 7.6.4. shall be met in order to alert the driver **or the ADS** to the inhibited or reduced state of ESC system functionality. This requirement does not apply for the ~~driver-selected~~ mode referred to in paragraph 7.5.1.2.

Insert new paragraph 7.8. and subparagraphs, to read:

7.8. Special provisions for categories X and Y

7.8.1. In the case of categories X and Y, all requirements in this regulation shall be fulfilled, and all respective tests shall be conducted.

7.8.2. Absence of a steering control

7.8.2.1. In the absence of a steering control (e.g. steering wheel), an equivalent parameter (e.g. steering rack translation) or the road wheel angle shall be used instead, and it shall be understood as a steering wheel angle applied throughout this regulation.

7.8.2.2. The measurement of the equivalent parameter during the tests can be performed by two methods: either through a vehicle internal signal or by an external measurement device fitted. In case the vehicle internal signal is used, it shall be demonstrated by the manufacturer to the satisfaction of the technical service that there are no relevant differences between the measured values. Differences shall be less than or equal to 5 per cent.

Paragraph 8.3.2., amend to read:

8.3.2. Vehicle mass. The vehicle is loaded with the fuel tank filled to at least 90 per cent of capacity, and a total interior load of 168 kg comprised of the test driver, approximately 59 kg of test equipment (automated steering machine, data acquisition system and the power supply for the steering machine), and ballast as required to make up for any shortfall in the weight of test drivers and/or test equipment. Where required, ballast shall be placed **in a location within the vehicle that reflects the intended mass distribution and is specified by the manufacturer. For vehicles with conventional seating,** ballast may be placed on the floor behind the passenger front seat or if necessary in the front passenger foot well area. All ballast shall be secured in a way that prevents it from becoming dislodged during testing.

Insert new paragraph 8.3.6., to read:

8.3.6. Special provisions for vehicles of categories X and Y

Notwithstanding 8.3.5., in the case of categories X and Y, no external automated steering machine shall be used. To execute the required steering pattern in paragraphs 9.5.2., 9.5.3., 9.6. and 9.9., the steering equipment of the vehicle shall be used, with dedicated activation methods, which may include:

(a) A test mode allowing to manually control or trigger the steering functions, or

(b) Any other method subject to agreement between the vehicle manufacturer and the technical service, ensuring that the evaluation accurately reflects real-world ADS steering performance.

Insert new paragraph 9.12. and subparagraphs, to read:

9.12. Special provisions for vehicles of categories X and Y

9.12.1. Test speed

In case the vehicle is not capable to reach the prescribed speeds for the test procedure specified in paragraphs 9.4., to 9.6. and 9.9.1., the maximum design speed of the vehicle shall be used instead.

9.12.2. Steering performance

In accordance with 8.3.6., if the vehicle is not able to carry out the manoeuvres specified in 9.5.2. and 9.5.3. or the Sine with Dwell test as specified in 9.9., the maximum achievable steering rate ~~performance allowed by the ADS~~ shall be used instead.

9.12.3. Lack of tyre saturation

In the case of vehicles which do not reach tyre saturation (as defined in paragraph 9.9.4.) at the maximum speed and steering rate attainable:

9.12.3.1. A test shall be agreed between the vehicle manufacturer and the Technical Service and carried out on a test surface with a lower grip than that specified in paragraph 8.2.

9.12.3.2. The test shall demonstrate that the ESC system has a positive effect on vehicle stability, such that without the intervention of the ESC, the manoeuvre would result in loss of stability. The dynamic manoeuvres, test conditions and results shall be included in the test report.

9.12.3.3. Such vehicles are not required to undergo the Sine with Dwell test as specified in paragraph 9.9.

9.12.4. Brake conditioning

When executing the stops in paragraph 9.4.2., sufficient brake demand shall be applied to bring the vehicle's antilock braking system (ABS) into operation for a majority of each braking event.

9.12.5. Tyre conditioning

In case the vehicle is not able to reach the prescribed lateral acceleration in paragraph 9.5.1., the radius of the circle shall be decreased either until the lateral acceleration is reached or until full lock.

In case the vehicle is not able to reach the prescribed lateral acceleration in paragraph 9.5.2., the lateral acceleration resulting by the maximum achievable steering rate shall be used instead.

9.12.6. Slowly increasing steer procedure

An equivalent steering pattern to that specified in 9.6. shall be defined by the vehicle manufacturer and shall be agreed with the Technical Service and appended to the type approval documentation.

9.12.7. ESC malfunction detection

An equivalent method to that specified in 9.10. shall be defined by the vehicle manufacturer and shall be agreed with the Technical Service and appended to the type approval documentation.

9.12.8. Post data processing – calculations for performance metrics

An equivalent method to that specified in paragraph 9.11. shall be defined by the vehicle manufacturer and shall be agreed with the Technical Service and appended to the type approval documentation.

In particular, it shall be established and explained in the type approval documentation, how

(a) The filtering method of the raw signals, as defined in paragraphs 9.11.1. to 9.11.3.,

(b) The calculation and filtering of the steering speed, as defined in paragraph 9.11.4.,

(c) Zeroing the signals, as defined in paragraph 9.11.5.,

(d) Definition of BOS and COS, as defined in paragraphs 9.11.6. and 9.11.7.,

(e) The time instances for yaw rate measurements, as defined in paragraph 9.11.8.,

(f) The lateral displacement measurement, as defined in paragraph 9.11.9.,

were adjusted according to the actual sine wave pattern and measurement signal parameters used during the Test Procedure.

VIII. Proposal for a supplement to the 02 series of amendments of UN Regulation No. 152 on Advanced Emergency Braking Systems (AEBS)

A. Amendments proposal

Paragraph 1, amend to read:

"1. Scope

This 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.

It does not apply to vehicles of categories X and Y¹."

Footnote 1, amend to read:

¹ As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.68, para. 2—
~~<https://unece.org/transport/vehicle-regulations/wp29/resolutions>~~
<https://unece.org/transport/vehicle-regulations/wp29/resolutions>"

Paragraph 5.4.4, amend 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. Special provisions for vehicles equipped with an ADS¹"~~

Insert new paragraphs 5.4.4.1 to 5.4.4.3:

- "5.4.4.1. The AEBS shall be automatically deactivated whilst an ADS feature is active.**
- 5.4.4.2. The AEBS shall be automatically reactivated upon deactivation of an ADS feature.**
- 5.4.4.3. The provisions of paragraph 5.4.3. do not apply whilst an ADS feature is active.**

B. Justification

1. The existing text of 5.4.4. was previously added to address the compatibility of AEBS with ADS (in particular ALKS). Since that time, understanding of ADS has developed and it is no longer deemed appropriate to suggest that the 'collision avoidance capabilities' of an ADS should be compared to those of an AEBS, since an ADS is expected to perform with at least the safety level of a competent and careful human driver throughout its ODD, whilst

AEBS has limited performance expectations which are only expected to be fully met within the boundary conditions specified in the regulation.

2. AEBS is a driver assistance feature and therefore has no role whilst an ADS is performing the DDT.

3. Therefore, it is proposed to replace the existing provision with three new provisions to ensure:

(a) The AEBS is disabled whenever an ADS feature is active (i.e. whilst the ADS is performing the DDT)

(b) The AEBS is re-enabled when the ADS feature is deactivated (i.e. when a driver has taken over performance of the DDT)

(c) The warning normally given to inform the driver that AEBS has been switched off is not required when the ADS is performing the DDT.

4. In the case that one ADS feature is deactivated at the same time as another ADS feature is activated (i.e. a transition directly between ADS features), 5.4.4.1. takes precedent and it is not expected to re-enable AEBS in this case.

5. It should be understood that the term ‘ADS Feature’ includes ALKS.