

Proposal for amendments to Regulation No. 79 (Steering equipment)

Proposed changes with regard to the implementation of technical specifications for Lane Departure Warning Systems (LDWS)

Note: The text reproduced below was prepared by the expert from Germany in order to introduce in Regulation No. 79 technical specifications on Lane Departure Warning Systems (LDWS) taking into account the discussions and agreements of the GRRF informal on AEBS / LDWS achieved so far. The modifications to the existing text of the Regulation are marked in ***bold and italic*** characters.

**A. PROPOSAL:**

1. SCOPE

1.1. This Regulation applies to the steering equipment of vehicles of categories M, N and O. <sup>1/</sup>

Insert a new paragraph 1.1.1 to read:

***1.1.1 This Regulation applies to also "Lane Departure Warning Systems"***

1.2. ...

2. DEFINITIONS

2.1. -2.2. ...

2.3. amend to read:

2.3. "Steering equipment" means all the equipment the purpose of which is to determine the direction of movement of the vehicle ***and to get information about unintentional drift of the vehicle out of its travel lane.***

2.3.1. - 2.3.3. ...

Insert a new paragraph 2.3.4. to read:

***2.3.4 . "Lane Departure Warning System (LDWS)" means a system to warn the driver of an unintentional drift of the vehicle out of its travel lane.***

***2.3.5 ["Lane" means one of the longitudinal strips into which a roadway is divided] or ["Lane" means the path of roadway that a vehicle would be expected to travel along without any driver steering input to change the path of travel.] or ["Lane" means the area of roadway that a vehicle would be expected to travel along in the absence of any obstruction and without the driver desire to change the path of travel.]***

- 2.3.6. *“Visible lane marking” means delineators intentionally placed on the borderline of the lane that are directly visible by the driver while driving (e.g. not covered by snow, etc.).*
- 2.3.7. *“Lane boundary” means the borderline of the lane that is determined by a visible lane marking.*
- 2.3.8. *“Rate of departure” means the subject vehicle’s approach velocity at a right angle to the lane boundary at the warning issue point.*

Following numbers amend to read:

- 2.3.9. “Advanced Driver Assistance Steering System” means ...
- 2.3.9.1. “Automatically commanded steering function” means ...
- 2.3.9.2. “Corrective steering function” means ...
- 2.3.10. “Steered wheels” means ...
- 2.3.11. “Energy supply” includes ...
- 2.3.11.1. “Energy source” means ...
- 2.3.11.2. “Energy reservoir” means ...
- 2.3.11.3. “Storage reservoir” means ...
- 2.4. – 4.8. ...

## 5. CONSTRUCTION PROVISIONS

### 5.1. General provisions

5.1.1. - 5.1.9. ...

Insert a new paragraph 5.1.10. to read:

**5.1.10. *Additional requirements for vehicles equipped with Lane Departure Warning Systems***

**5.1.10.1** *If vehicles of categories M2, M3, N2 or N3 1/ are fitted with Lane Departure Warning Systems complying with the definition of paragraph 2.3 then they shall meet the requirements of Annex 7.*

*If Lane Departure Warning Systems are voluntarily fitted by the manufacturer to a vehicle in categories M<sub>1</sub> or N<sub>1</sub> 1/ the application of Annex 7 is also possible.*

**5.1.10.2** *[The effectiveness of any LDWS fitted on a vehicle, including the electric control line, shall not be adversely affected by magnetic or electrical fields. This shall be demonstrated by compliance with Regulation No. 10, in its latest series of Amendments.]*

Following number amend to read:

5.1.**11.** Control systems

...

5.2. – 11. ...

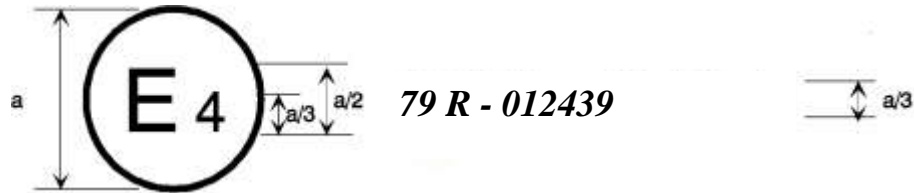
Annex 2, amend to read:

Annex 2

ARRANGEMENTS OF APPROVAL MARKS

Model A

(See paragraph 4.4. of this Regulation)



**or:**

***79 R(7) - 012439***

a = 8 mm min

The above approval mark affixed to a vehicle shows that the vehicle type concerned has, with regard to steering equipment, been approved in the Netherlands (E4) pursuant to Regulation No. 79 under approval No. 012439. The approval number indicates that the approval was granted in accordance with the requirements of Regulation No. 79 incorporating the 01 series of amendments. ***In the case the requirement of Annex 7 are also fulfilled shall the letter “R” a number “7” in brackets following***

...

Insert a new Annex 7, to read:

*"Annex 7*

***REQUIREMENTS FOR VEHICLES FITTED WITH LANE DEPARTURE WARNING SYSTEMS***

***1. GENERAL***

***1.1 This annex defines the requirements for Lane Departure Warning Systems (LDWS).***

***1.2 In the case a system defined in paragraph 2.3.9 of the regulation (e.g. a Lane Keeping System) fulfilled the requirements of this annex then the approval mark defined in annex 2 shall be the same as LDWS"***

***2. DOCUMENTATION***

***2.1. The manufacturer shall provide a brief documentation package which gives access to the basic design of the system and, if applicable, the means by which it is linked to other vehicle systems. The function of the system shall be explained and the documentation shall describe how the current operational status of the system can be checked.***

***2.1.1. Boundary conditions***

***Limits defining the boundaries of functional operation shall be stated where appropriate to system performance.***

***2.1.2. Functions of the units***

***The function of each unit of the system shall be outlined and the signals linking it with other units or with other vehicle systems shall be shown. This may be provided by a labelled block diagram or other schematic, or by a description aided by such a diagram.***

***2.1.3. Interconnections and signal flow***

***Interconnections within the system shall be shown, e.g. by a circuit diagram for the electric transmission links. There shall be a clear correspondence between these transmission links and the signals carried between units.***

***2.1.4. Identification of units***

***Each unit shall be clearly and unambiguously identifiable (e.g. by marking for hardware and marking or software output for software content) to provide corresponding hardware and documentation association.***

***Where functions are combined within a single unit or indeed within a single computer, but shown in multiple blocks in the block diagram for clarity and ease of explanation, only a single hardware identification marking shall be used. The manufacturer shall, by the use of this identification, affirm that the equipment supplied conforms to the corresponding document.***

### **3. SPECIFICATIONS**

#### **3.1. Performance requirements**

**3.1.1. Whenever the system is active, the LDWS shall provide the driver with a warning signal if the vehicle departs from its lane, on straight lanes as well as curved lanes down to 250 m radius, where this is marked with a visible lane marking. Specifically, when tested as in paragraph 4.5. it shall:**

**3.1.1.1. provide the driver with the warning specified in paragraph 3.3.1. when tested in accordance with the provisions of paragraph 4.5. (departure warning test) using a straight lane [Footnote: The visible lane marking used in the tests shall be one of those identified in ISO 17361:2007 Annex A, with the actual markings being in good condition and of a material conforming to the National standard for visible road surface markings of the country in which the testing is being carried-out. The actual visible lane marking layout used for the testing shall be recorded.], and**

**3.1.1.2. provide the driver with the warning specified in paragraph 3.3.2. when tested in accordance with the provisions of paragraph 4.6. (failure detection test).**

**3.1.1.3. The warning mentioned in para 3.1.1.1. above may be suppressed when there is a [driver] action which indicates an intention to depart from lane.**

**3.1.2. The LDWS shall be active at least at vehicle speeds above 60 km/h, unless manually deactivated as per paragraph 3.2. below.**

**3.2. When a vehicle is equipped with a means to disable the LDWS function, the following conditions shall apply as appropriate:**

**3.2.1. The LDWS function shall be automatically reinstated at the initiation of each new ignition “on” (run) cycle.**

**3.2.2. A [constant] optical warning signal shall inform the driver that the LDWS function has been disabled. The yellow warning signal specified in paragraph 3.3.2 below may be used for this purpose.**

#### **3.3. Warning indication**

**3.3.1. The lane departure warning referred to in paragraph 4.5. shall be provided by means of at least one easily perceivable warning signal among acoustic and haptic [for N2 and N3 vehicles and among optic, acoustic and haptic for M2 and M3 vehicles].**

**[3.3.1.1 When an optical signal is used for lane departure warning, the optical signal for lane departure warning may be the flashing of the malfunction warning signal specified in paragraph 3.3.2. below.]**

- 3.3.2. *The failure warning referred to in paragraph 4.6. shall be by means of a yellow optical warning signal.*
- 3.3.3. *Any LDWS optical warning signal shall be activated either when the ignition (start) switch is turned to the "on" (run) position or when the ignition (start) switch is in a position between the "on" (run) and "start" that is designated by the manufacturer as a check position (bulb check).  
The warning signal(s) shall be automatically deactivated when the ignition (start) switch is moved to the "on" (run) position or after a period of time as identified by the vehicle manufacturer in the case where the signal activation occurs in the "on" (run) position.  
This requirement does not apply to warning signals shown in a common space.*
- 3.3.4. *The optical warning signals shall be visible even by daylight; the satisfactory condition of the signal must be easily verifiable by the driver from the driver's seat.*
- [3.3.5. *The failure warning signal specified in paragraph 3.3.2 may also be used to indicate that LDWS is temporarily not available.*]

#### 4. **TEST PROCEDURE**

##### 4.1. *Test conditions*

4.1.1. *The test shall be performed on a flat, dry asphalt or concrete surface.*

4.1.2. *The ambient temperature shall be between 0° C and 45° C.*

##### [4.1.3. *Visible lane markings*

4.1.3.1. *The markings of the test location shall be in a good condition.*

4.1.3.2. *The left edge road marking pattern shall be a continuous 0.2 m wide line parallel to the axis of the road.*

4.1.3.4. *The centre line road marking pattern shall be 2.5 m length and 0.15 m wide segments separated by 10 m voids.*

4.1.3.6. *The right edge road marking pattern shall be a continuous 0.2 m wide line parallel to the axis of the road.]*

4.1.4. *The test shall be performed under visibility conditions that allow safe driving at the required test speed.*

##### 4.2. *Accuracy of the measurements*

4.2.1. *Distances shall be measured with an accuracy of +/- [5 cm].*

4.2.2. *Longitudinal vehicle speed shall be [measured] with an accuracy of +/- 3 km/h*

4.2.3. *Rate of departure accuracy shall be measured with an accuracy of +/- 0.1 m/s*

4.3. *Vehicle conditions*

4.3.1. *Test weight*

*The vehicle may be tested at any condition of load, the distribution of the mass among the axles being that stated by the vehicle manufacturer without exceeding any of the maximum permissible mass for each axle. No alteration shall be made once the test procedure has begun.*

4.3.2. *“In the case where the LDWS is equipped with a user-adjustable warning threshold, [each / the] test shall be performed with the warning threshold set at its maximum departure setting. No alteration shall be made once the test procedure has begun.”*

4.4. *Optical warning signal verification test*

*With the vehicle stationary check that the optical warning signal(s) comply with the requirements of paragraph 3.3.3.*

4.5. *Lane departure warning test*

4.5.1 *Drive the vehicle at a speed of 65 km/h [+/- 2 km/h] into the centre of the test lane in a smooth manner so that the attitude of the vehicle is stable. Maintaining the prescribed speed, gently drift the vehicle, either to the left or the right, at a rate of departure of between 0.1 and 0.8 m/s so that the vehicle crosses the lane marking. Repeat the test at a different rate of departure within the range 0.1 and 0.8 m/s.  
Repeat the above tests drifting in the opposite direction.*

4.5.2. *The LDWS shall provide the lane departure warning indication mentioned in paragraph 5.4.1. at the latest when the outside of the tyre of the vehicle’s front wheel crosses a line 0,3 m beyond the outside of the visible lane marking.”*

4.6. *Failure detection*

4.6.1. *Simulate an LDWS failure, [for example] by disconnecting the power source to any LDWS component or disconnecting any electrical connection between LDWS components. When simulating an LDWS failure, neither the electrical connections for the failure warning signal of paragraph 3.3.2 or the LDWS disable control of paragraph 3.2. shall be disconnected.*



- 4.6.2.** *The LDWS warning signal shall be activated and remain activated while the ignition is “on”. A subsequent “off” “on” ignition cycle shall result in the warning signal being reactivated.*

**B. JUSTIFICATION:**

Some Contracting Parties take the obligatory equipment of “lane departure warning systems” (LDWS) into consideration. To achieve an optimal road safety increase with these systems it is necessary to provide minimal requirements.

For several reasons the implementation of LDWS in Regulation No. 79 is more sensible and practical than a new Regulation on LDWS:

- It is already possible to get an approval for LDWS according to Regulation No. 79 on a voluntary basis.
- In its introduction Regulation No. 79 already takes evolutions of LDWS including active intervention on the steering system into account.
- An additional Regulation would generate a second possibility to approve LDWS and could thus lead to contradicting approvals for the same kind of system.
- With a new Regulation, vehicles, for which LDWS is not mandatory, could be fitted with an LDWS approved according to Regulation No. 79 which might differ from the requirements in a new Regulation.
- Integrating LDWS requirements in Regulation No. 79 would ensure that the vehicle manufacturer is in charge for the approval of the system.
- The process to change Regulation No. 79 is faster and more easy.

The above proposed amendments take into account the results of the GRRF informal group on AEBS and LDWS achieved at its 3<sup>rd</sup> meeting in December 2009 as far as possible.

For N2 and N3 vehicles at least 1 warning among acoustic or haptic is foreseen for LDWS since an optical warning seems to be an inappropriate warning for a situation of drowsiness or inattention.

The paragraph with regard to electromagnetic interference (5.1.10.2.) is taken from ECE R 13.

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