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## Economic Commission for Europe

Inland Transport Committee

World Forum for Harmonization of Vehicle Regulations

Working Party on General Safety Provisions

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Geneva, 8–11 October 2013

Item 6 of the provisional agenda

**Regulation No. 46 (Devices for indirect vision)**

### **Proposal for amendments to Regulation No. 46 (Devices for indirect vision)**

**Submitted by the expert from Germany\***

The text reproduced below was prepared by the expert from Germany to introduce requirements allowing the installation of exterior mirrors with automatic pivoting function on the passenger side of a vehicle. The modifications to the current text of the Regulation are marked in bold characters.

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\* In accordance with the programme of work of the Inland Transport Committee for 2010–2014 (ECE/TRANS/208, para. 106 and ECE/TRANS/2010/8, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

## I. Proposal

*Insert a new paragraph 15.1.2.1., to read:*

**"15.1.2.1. Notwithstanding the provisions of paragraph 15.1.2., the glass of the exterior rear view mirror on passenger side may be designed as automatically pivoting."**

*Paragraph 15.2.1.1.1., the table (row for vehicles of category M<sub>1</sub>), column of exterior mirror of Class III, amend to read:*

*"Compulsory*

*1 on the driver's side and 1 on the passenger's side. Class II mirrors may be fitted as an alternative.*

*Optional*

**Exterior mirrors with automatic pivoting function on passenger side."**

*Insert after Figure 6 new paragraphs 15.2.4.3.2.1. to 15.2.4.3.2.5., to read (including new Figures 6a to 6c):*

**"15.2.4.3.2.1. Exterior rear view mirror on passenger side with automatic pivoting system.**

**Automatic pivoting of the glass of the exterior rear view mirror on the passenger side shall be allowed in the case:**

- (a) **The direction indicator on the passenger side is activated permanently (no one-touch turn signal), and**
- (b) **The steering wheel angle is greater than 1° in direction of passenger side, and**
- (c) **The speed of the vehicle is less or equal to 50 km/h, and**
- (d) **The reverse gear is not engaged.**

**15.2.4.3.2.2. The mirror glass shall return to its original position, if one of these conditions is not met. It shall also return to the original position, if the reverse gear is engaged.**

**It shall be possible for the driver to switch off the automatic pivoting function.**

**15.2.4.3.2.3. The mirror glass reference angle is the angle assumed by a projection of the mirror glass normal vector onto the road surface relative to the vehicle-fixed x-axis when the mirror glass is in the reference position.**

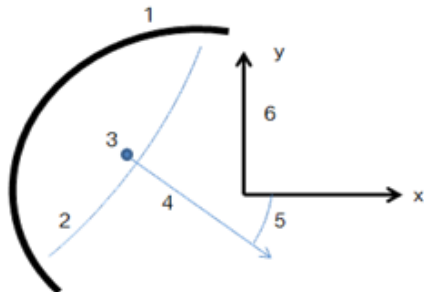
**The reference position is the position of the mirror glass that fulfils the required field of vision according to paragraph 15.2.4.3.2. The reference position is defined in the test procedure for granting type approval.**

**The difference between the mirror glass reference angle and the maximum pivoting angle shall not exceed 15°. The glass shall only be pivoted in the direction that turns the field of vision away from the vehicle.**

**15.2.4.3.2.4. The maximum pivoting angle is the angle assumed by a projection of the normal vector of the mirror glass onto the road surface relative to the vehicle-fixed x-axis when the mirror glass is in the maximum pivoted position.**

The normal vector of the mirror glass is the vector that runs vertically through the mirror glass surface initiating from the centre of gravity of the mirror glass surface.<sup>1</sup>

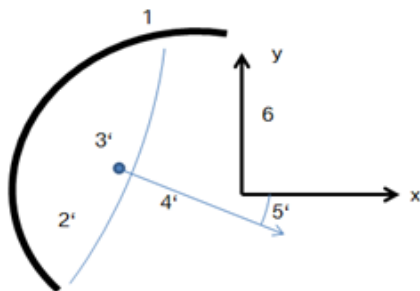
Figure 6a  
Definition of mirror glass reference direction



Reference position

- 1 Horizontal section through exterior mirror body
- 2 Mirror glass surface
- 3 Centroid of the area of mirror glass
- 4 Mirror glass normal vector, corresponds in this view to the projection of 4 onto the road surface
- 5 Mirror glass reference angle
- 6 Vehicle coordinate system

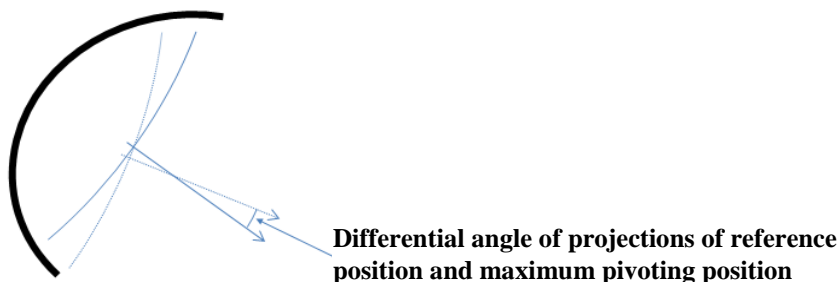
Figure 6b  
Definition of maximum pivoting direction



Maximum pivoting position

- 1 Horizontal section through exterior mirror body
- 2' Mirror glass surface
- 3' Area centre of gravity of mirror glass
- 4' Mirror glass normal vector, corresponds in this view to the projection of 4 onto the road surface
- 5 Maximum mirror glass pivoting angle
- 6 Vehicle coordinate system

Figure 6c  
Maximal permitted difference between reference position and maximum pivoted position

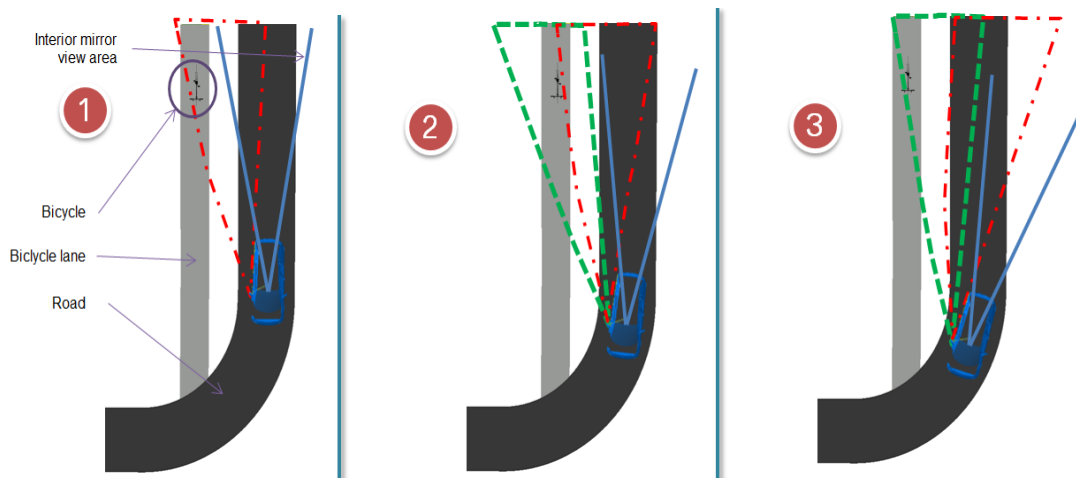


15.2.4.3.2.5. During the turning manoeuvre in the direction of the passenger side the pivoting angle of the mirror and the yaw rate of the vehicle have to be concordant. The maximum difference between the yaw rate and the pivoting angle of the mirror glass shall not exceed 6°."

<sup>1</sup> The centre of gravity represents the centroid of the visible area of the reflecting surface as defined in this Regulation.

## II. Justification

1. The current text of UN Regulation No. 46 allows only mirrors that do not alter the measured field of vision. This restriction restrains the technological progress and could hinder progress in addressing dangerous traffic situations.
2. During a turning manoeuvre, the present mirror design prevents a road user that can be seen in the field of vision of the driver before the turn from being seen during the turning manoeuvre (see figures below).
3. This proposal for an amendment of the Regulation is supposed to contribute to the prevention of such dangerous traffic situations. It is proposed to allow the pivoting of the mirror glass at the passenger side of a vehicle to enable a better field of vision for the driver during turning manoeuvres especially in city-areas compared to the field of vision that can be obtained with conventional mirrors.



Vehicle is just before road curve, about to make a turn.  
Cyclist is visible in exterior rear view mirror on passenger side (red-dotted field of vision)

Vehicle entered road curve, yaw angle 8°. At standard non-pivoting mirrors the cyclist disappears from the field of view of the driver (red). With fully pivoted mirror the cyclist can still be seen however (green). Through mirror pivoting the original field of view remains effective for a longer period.

As from approximately 18° yaw angle the cyclist almost disappears from the field of view despite pivoted mirror (green). Now, a near cyclist who is at risk of a collision can be seen through the side window however. Cyclists yet further away and not directly visible through the side window or in the mirror are no longer affected by the direction of travel of the vehicle.

**Explanation:**

- Blue colour: field of vision interior mirror
- Red colour: field of vision exterior mirror without automatic pivoting function on passenger side.
- Green colour: field of vision exterior mirror with automatic pivoting function on passenger side.