

ADAPTIVE DRIVING BEAM

Status of work following 8th meeting held jointly with GRE Experts on 25 February 2010

According to the agreement reached at the GRE 62nd session, GTB has continued to work upon the proposals to develop provisions in Regulations 48 and 123 for the Adaptive Driving (Main) Beam and invited GRE experts to participate in taskforce meetings held in Paris on 25 November 2009, Frankfurt on 26 January 2010 and Frankfurt on 25 February 2010.

Whilst good progress was made to address the concerns expressed by the contracting parties, it has not been possible to resolve all issues and as a result GTB is unable to present a formal proposal to this 63rd session. However, a status report has been prepared and is presented on the following pages. This is complemented by an introductory presentation of the progress of the technology and the issues to be addressed.

This informal document contains a table providing an overview of the provisions being developed for R48 and showing the requirements relative to both the Automatic Activation and Deactivation Systems and to the Adaptive Systems. Please note that in order to present the simplest possible overview, the basic intention of each of the provisions is shown and reference to paragraph numbering is suppressed. For a fully detailed version of the draft amendments please refer to the following annexes:

- | | |
|---------|---|
| Annex 1 | The current status of the detailed draft amendments to Regulation 48 relating to the Automatic Activation and Deactivation Systems |
| Annex 2 | The current status of the detailed draft amendments to Regulation 48 relating to the Adaptive Systems |
| Annex 3 | The current status of the detailed draft amendments to Regulation 123 relating to the Adaptive Systems. There are no major issues associated with the provisions for Regulation 123 except for the question of whether it is permissible for the system to be designed for right hand or left hand traffic only. (Please refer to the Red Text on Page 16). |

GTB has greatly appreciated the contribution of the GRE experts who joined the taskforce meetings and would now like to seek advice from the contracting parties relating to the open issues highlighted in this document. The intention is to finalise the work of the GTB taskforce so that a formal proposal can be submitted in time for consideration to the 64th session in October 2010.

To facilitate the discussion the following are the main open issues to be addressed:

1. **Provision 2:** Does the definition of a standard performance for bicycle lamps satisfy the requirements of the contracting parties to take the effects of the system upon cyclists into account? Are different sensor characteristics required for the automatic activation / deactivation and for the adaptive systems?
2. **Provision 4:** Should the sensing requirements be 300/100 metres or 450/250m respectively?
3. **Provision 9:** What requirements should be defined for the verification of satisfactory performance during a test drive by the technical services? Should there be different requirements for automatic activation and deactivation and for adaptive systems?
4. **R123 :** Is it permissible for the system to be designed for right hand traffic or left hand traffic only?

**Proposals for Provisions to be introduced into Regulation 48
(Status of work following 8th meeting held jointly with GRE Experts on 25 February 2010)**

**Open issues are indicated in RED text
(For the open issue related to Regulation 123 please refer to page 16)**

<i>Provision</i>	Automatic Activation Deactivation of Main Beam	Adaptive Main Beam
1. Control	May be automatic	May be designed to be adaptive
	Always possible to switch on and off manually	
<i>Comment</i>		
<i>Status</i>	Agreed	

<i>Provision</i>	Automatic Activation Deactivation of Main Beam	Adaptive Main Beam
2. Sensor Requirements	<p>the control signals being produced by a sensor system which is capable of detecting and reacting to all the following:</p> <ul style="list-style-type: none"> - ambient lighting conditions; - the light emitted by the front lighting, front light-signalling devices or retro-reflected light of oncoming vehicles; - the light emitted by the rear light-signalling devices or retro-reflected light of preceding vehicles. <p>Additional sensor functions to improve performance are allowed.</p> <p>For the purpose of this paragraph, “vehicles” means vehicles of categories L, M, N, O, T, as well as bicycles, such vehicles being equipped with retro-reflectors, with lighting and light-signalling devices, which are switched ON.</p>	
<i>Comment</i>	This paragraph takes bicycles into account	
<i>Status</i>	Are different sensor characteristics required for the automatic activation / deactivation and for the adaptive systems?	

<i>Provision</i>	Automatic Activation Deactivation of Main Beam	Adaptive Main Beam		
3. Sensor Requirements	The boundaries of the minimum fields in which the sensor is able to detect (light emitted or retro-reflected from) other vehicles according to paragraphs 6.1.7.1. / 6.1.7.2 and 6.22.9.3.1.2 / 3 are defined by the angles indicated below. These angles are measured from the centre of the sensor aperture relative to a horizontal straight line through its centre and parallel to the longitudinal median plane of the vehicle.			
	-- Horizontal angles: 15° to the left and 15° to the right.			
	-- Vertical angles:			
		Upward angle	5°	
	Mounting height of the sensor (centre of sensor aperture above the ground)	Not larger than or equal 2m	Between 1.5m and 2.5m	Larger than 2.5m
	Minimum Downward angle	2°	2° to 5°	5°
<i>Comment</i>	To ensure an adequate view of the forward road scene			
<i>Status</i>	Discussion continues over the acceptability of having “overlapping” requirements			

<i>Provision</i>	Automatic Activation Deactivation of Main Beam	Adaptive Main Beam		
4. Sensor Requirements	The sensor shall be able to detect on a straight level road:			
	- an oncoming power driven vehicle at a distance extending to at least [300] [450] m;			
	- a preceding power driven vehicle or a vehicle/ trailers combination at a distance extending to at least [100] [200] m;			
	- an oncoming bicycle at a distance extending to at least 50m, its illumination represented by a white lamp with a luminous intensity of 150cd with a light emitting area of 10cm ² and a height above a ground of 0.8m.			
<i>Comment</i>	Includes the definition a standard bicycle lamp performance in the absence of an international standard			
<i>Status</i>	Debate continues over the requirements for the minimum sensing distance. GTB experts, support the 300 /100 metre values (based upon the research findings in the UMTRI report 2006/11and upon experience with systems actually installed on vehicles and operating in real traffic) whilst GRE experts support the higher values as recommended by the Darmstadt University Research.			

<i>Provision</i>	Automatic Activation Deactivation of Main Beam	Adaptive Main Beam
5. Visual indication to driver	If the control of the main-beam headlamps is automatic as described in paragraph 6.1.7.1. above, visual information shall be provided to the driver to indicate that the automatic operation of the main-beam function is activated. This information shall remain displayed as long as the automatic operation is activated	If the main-beam is adaptive, a visual tell tale shall be provided to indicate to the driver that the adaptation of the main beam is activated. This information shall remain displayed as long as the adaptation is activated.
<i>Comment</i>	Introduces requirements to indicate to the driver that the system is active.	
<i>Status</i>	Agreed	

<i>Provision</i>	Automatic Activation Deactivation of Main Beam	Adaptive Main Beam
6. Automatic Operation	The transition from main-beam to dipped-beam according to the conditions indicated in paragraph 6.1.7.1. above, shall occur fast enough to avoid discomfort.	Automatic operation of the AFS The changes within and between the provided classes and their modes of the AFS lighting functions as specified below, shall be performed automatically without causing discomfort, distraction or glare , neither for the driver nor for other road users. The following conditions apply for the activation of the classes and their modes of the passing beam and, where applicable, of the main-beam
<i>Comment</i>	Introduces requirements concerning the need to avoid discomfort, distraction or glare, neither for the driver nor for other road users	
<i>Status</i>	Agreed	

<i>Provision</i>	Automatic Activation Deactivation of Main Beam	Adaptive Main Beam
7. Activation Conditions	<p>The control of the main-beam headlamps may be such that the main-beam headlamps are only switched ON automatically when:</p> <ul style="list-style-type: none"> - no vehicles, as mentioned in paragraphs 6.1.7.1. and 6.1.7.2. above, are detected within the fields and distances according to paragraphs 6.1.9.3.1.3. and to paragraph 6.1.9.3.1.1. <p>And</p> <ul style="list-style-type: none"> - relative to the detected ambient lighting level as prescribed below. <p>In the case main-beam headlamps were switched ON automatically, they shall be switched OFF automatically when:</p> <ul style="list-style-type: none"> - oncoming or preceding vehicles, are detected within the fields and distances according to paragraphs 6.1.9.3.1.3. and to paragraph 6.1.9.3.1.1. <p>Moreover, they shall be switched OFF automatically when relative to the detected ambient lighting level as prescribed in paragraph 6.1.9.3.5. below.”</p> <p>However it shall always be possible to switch the main beam headlamp OFF manually.”</p>	
<i>Comment</i>	This relates specifically to the automatic activation and deactivation of the main beam and defines when the main beam is switched on and off	
<i>Status</i>	Agreed	

Provision	Automatic Activation Deactivation of Main Beam	Adaptive Main Beam												
<p>8. Activation Conditions</p>	<p>Shall be activated or deactivated relative to the ambient light conditions (e.g. switch ON during night-time driving conditions, tunnels, etc. or switch OFF in daylight or otherwise sufficient ambient lighting levels;) according to the requirements of the table below</p> <table border="1" data-bbox="689 336 1738 662"> <thead> <tr> <th colspan="2" data-bbox="689 336 1738 461"> AUTOMATIC ACTIVATION CONDITIONS OF The MAIN-BEAM HEADLAMPS <u>1/</u> </th> </tr> <tr> <th data-bbox="689 461 1240 523"> Ambient light outside the vehicle <u>2/</u> </th> <th data-bbox="1240 461 1738 523"> Main-beam headlamps </th> </tr> </thead> <tbody> <tr> <td data-bbox="689 523 1240 555"> Less or equal than 100lx </td> <td data-bbox="1240 523 1738 555"> shall be activated </td> </tr> <tr> <td data-bbox="689 555 1240 587"> between 100lx and 1000lx </td> <td data-bbox="1240 555 1738 587"> may be activated </td> </tr> <tr> <td data-bbox="689 587 1240 619"> between 1000 lx and [7,000] lx </td> <td data-bbox="1240 587 1738 619"> may be deactivated </td> </tr> <tr> <td data-bbox="689 619 1240 662"> more than [7,000] lux </td> <td data-bbox="1240 619 1738 662"> shall be deactivated </td> </tr> </tbody> </table> <p><u>1/</u> Compliance with these conditions shall be demonstrated by the applicant, by simulation or other means of verification accepted by the authority responsible for type approval.</p> <p><u>2/</u> The illuminance shall be measured on a horizontal surface, with a cosine corrected sensor on the same height as the mounting position of the sensor on the vehicle. This may be demonstrated by the manufacturer by sufficient documentation or by other means accepted by the authority responsible for type approval</p>		AUTOMATIC ACTIVATION CONDITIONS OF The MAIN-BEAM HEADLAMPS <u>1/</u>		Ambient light outside the vehicle <u>2/</u>	Main-beam headlamps	Less or equal than 100lx	shall be activated	between 100lx and 1000lx	may be activated	between 1000 lx and [7,000] lx	may be deactivated	more than [7,000] lux	shall be deactivated
AUTOMATIC ACTIVATION CONDITIONS OF The MAIN-BEAM HEADLAMPS <u>1/</u>														
Ambient light outside the vehicle <u>2/</u>	Main-beam headlamps													
Less or equal than 100lx	shall be activated													
between 100lx and 1000lx	may be activated													
between 1000 lx and [7,000] lx	may be deactivated													
more than [7,000] lux	shall be deactivated													
<i>Comment</i>	Introduces requirements associated with ambient lighting levels													
<i>Status</i>	Further discussion required to define the values													

Provision	Automatic Activation Deactivation of Main Beam	Adaptive Main Beam																											
<p>9. Verification</p>	<p>The overall performance of the automatic control shall be verified by:</p> <ul style="list-style-type: none"> - means of simulation or other means of verification accepted by the Technical Service responsible for type approval testing, as provided by the applicant <p>and</p> <ul style="list-style-type: none"> - a test drive in clear atmosphere <u>*/</u> at all relevant speed. This shall include any situation relevant to the automatic control of the main-beam headlamps as described by the applicant; in addition, compliance with paragraph 6.1.9.3.1.2. shall be verified. <p><u>*/</u> Good visibility (meteorological optical range MOR > 2, 000 m defined according to WMO, Guide to Meteorological Instruments and Methods of Observation, Sixth Edition, ISBN: 92-63-16008-2, pp 1. 9. 1/ 1. 9. 11, Geneva 1996) and clean lens."</p>	<p>To verify, that the adaptation of the main-beam does not cause any discomfort, distraction or glare, neither to the driver nor to oncoming and preceding vehicles, the technical service shall perform a test drive in clear atmosphere <u>*/</u> at all relevant speed, which comprises any situation relevant to the system control on the basis of the applicants description; activation, performance and deactivation of adaptation of the main-beam shall be recorded and checked against the data submitted by the applicant. The overall performance of the automatic control shall be demonstrated by the applicant by documentation or by other means accepted by the authority responsible for type approval. “</p> <p>The test course shall comprise: At speed corresponding to the relevant type of road:</p> <table border="1" data-bbox="1146 501 2096 1002"> <thead> <tr> <th rowspan="2">Traffic conditions</th> <th colspan="3">Road type</th> </tr> <tr> <th>Urban areas</th> <th>Motor way</th> <th>Country road</th> </tr> </thead> <tbody> <tr> <td>Single oncoming traffic Or Single preceding traffic In a frequency So that the system will be activated as well as deactivated to demonstrate the adaptation process. <u>x/</u></td> <td>[X]</td> <td>X</td> <td>X</td> </tr> <tr> <td>Combined oncoming and preceding traffic situations,; In a frequency so that the system will be activated as well as deactivated to demonstrate the adaptation process. <u>x/</u></td> <td></td> <td>X</td> <td>X</td> </tr> <tr> <td>Dense traffic;</td> <td>X</td> <td>X</td> <td>X</td> </tr> <tr> <td>Oncoming bicycle as described in paragraph 6.22.9.3.1.2.</td> <td></td> <td></td> <td>X</td> </tr> <tr> <td>Average percentage to sum of the full test course length</td> <td>10</td> <td>20</td> <td>70</td> </tr> </tbody> </table> <p>The urban areas shall comprise roads with illumination and without illumination. The motorway and the country road shall comprise parts with two lane road, and parts with four lane road (or more); straight level parts with a length of more than 600m as well as curves and a country road with junctions, hills, dips and a part with a winding road.</p> <p><u>x/</u> Test engineers shall sit in the vehicle be tested to this requirement and in tone of the oncoming and preceding vehicles</p>	Traffic conditions	Road type			Urban areas	Motor way	Country road	Single oncoming traffic Or Single preceding traffic In a frequency So that the system will be activated as well as deactivated to demonstrate the adaptation process. <u>x/</u>	[X]	X	X	Combined oncoming and preceding traffic situations,; In a frequency so that the system will be activated as well as deactivated to demonstrate the adaptation process. <u>x/</u>		X	X	Dense traffic;	X	X	X	Oncoming bicycle as described in paragraph 6.22.9.3.1.2.			X	Average percentage to sum of the full test course length	10	20	70
	Traffic conditions	Road type																											
Urban areas		Motor way	Country road																										
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Oncoming bicycle as described in paragraph 6.22.9.3.1.2.			X																										
Average percentage to sum of the full test course length	10	20	70																										
Comment	These proposals introduce detailed requirements to be verified during the test drive by the technical service.																												
Status	This is a proposal developed after the 8th GTB ADB Taskforce meeting of 25 February 2010. Further discussion required Should these requirements be common for automatic activation and deactivation and adaptive systems?																												

Annex 1

Proposals for Provisions to be introduced into Regulation 48
(Status of work following 8th meeting held jointly with GRE Experts on 25 February 2010)

Automatic Activation / Deactivation of the Main Beam

Insert a new paragraphs 6.1.7.1. to 6.1.7.2., to read:

- "6.1.7.1. The control of the main-beam headlamps may be automatic with regard to their activation and deactivation, the control signals being produced by a sensor system which is capable of detecting and reacting to the following:**
- **ambient lighting conditions;**
 - **the light emitted by the front lighting devices, front light-signalling devices or reflected from front retro-reflecting devices of oncoming vehicles**
 - **the light emitted by the rear light signalling devices or reflected from rear retro- reflecting devices of preceding vehicles.**
 -

Additional sensor functions to improve performance are allowed.

However it shall always be possible to switch the main-beam headlamps ON and OFF manually."

- 6.1.7.2. For the purpose of paragraph 6.1.7.1. above, "vehicles" means vehicles of categories L, M, N, O, T, and additionally includes bicycles equipped with retro-reflectors and front lighting which is switched ON."**

Paragraphs 6.1.7.1. to 6.1.7.3. (former), renumber as paragraphs 6.1.7.3. to 6.1.7.5.

Insert new paragraph 6.1.8.1., to read:

- "6.1.8.1 If the control of the main-beam headlamps is automatic as described in paragraph 6.1.7.1. above, visual information shall be provided to the driver to indicate that the automatic operation of the main-beam function is activated. This information shall remain displayed as long as the automatic operation is activated.
"**

Insert new paragraphs 6.1.9.3. to 6.1.9.4., to read:

"6.1.9.3. Automatic activation and deactivation of the main-beam headlamps:

6.1.9.3.1. The sensor used to control the automatic activation and deactivation of the main-beam headlamps, as described in paragraph 6.1.7.1., shall comply with the following requirements:

6.1.9.3.1.1. The boundaries of the minimum fields in which the sensor is able to detect (light emitted or retroreflected from) other vehicles according to paragraphs 6.1.7.1. and 6.1.7.2. above are defined by the angles indicated below. These angles are measured from the centre of the sensor aperture relative to a horizontal straight line through its centre and parallel to the longitudinal median plane of the vehicle.

-- Horizontal angles: 15° to the left and 15° to the right.

-- Vertical angles:

Upward angle	5°		
Mounting height of the sensor (centre of sensor aperture above the ground)	Not larger than or equal 2m	Between 1.5m and 2.5m	Larger than 2.5m
Minimum Downward angle	2°	2° to 5°	5°

6.1.9.3.1.2. The transition from main-beam to dipped-beam according to the conditions indicated in paragraph 6.1.7.1. above, shall occur fast enough to avoid discomfort.

6.1.9.3.1.3. The sensor shall be able to detect on a straight level road:

- an oncoming power driven vehicle at a distance extending to at least { [300] [450] }m;**
- a preceding power driven vehicle or a vehicle/ trailers combination at a distance extending to at least { [100] [200] }m;**
- an oncoming bicycle at a distance extending to at least 50m, its illumination represented by a white lamp with a luminous intensity of 150cd with a light emitting area of 10cm² and a height above a ground of 0.8m.**

6.1.9.3.2. The overall performance of the automatic control shall be verified by:

- means of simulation or other means of verification accepted by the Technical Service responsible for type approval testing, as provided by the applicant and
 - a test drive in clear atmosphere */ at all relevant speed.
- This shall include any situation relevant to the automatic control of the main-beam headlamps as described by the applicant; in addition, compliance with paragraph 6.1.9.3.1.2. shall be verified.”

["Annex xxx] (Test course specification) {see Annex 2} ???
(Dr. Manz) Should there be a difference between this switched solution and the ADB!

*/ Good visibility (meteorological optical range MOR > 2, 000 m defined according to WMO, Guide to Meteorological Instruments and Methods of Observation, Sixth Edition, ISBN: 92-63-16008-2, pp 1. 9. 1/ 1. 9. 11, Geneva 1996) and clean lens."

- 6.1.9.3.3.** The control of the main-beam headlamps may be such that the main-beam headlamps are only switched ON automatically when:
- no vehicles, as mentioned in paragraphs 6.1.7.1. and 6.1.7.2. above, are detected within the fields and distances according to paragraphs 6.1.9.3.1.3. and to paragraph 6.1.9.3.1.1.
 - and
 - relative to the detected ambient lighting level as prescribed in paragraph 6.1.9.3.5. below.”

- 6.1.9.3.4.** In the case main-beam headlamps were switched ON automatically, they shall be switched OFF automatically when:
- oncoming or preceding vehicles, as mentioned in paragraphs 6.1.7.1. and 6.1.7.2. above, are detected within the fields and distances according to paragraphs 6.1.9.3.1.3. and to paragraph 6.1.9.3.1.1.

Moreover, they shall be switched OFF automatically when relative to the detected ambient lighting level as prescribed in paragraph 6.1.9.3.5. below.”

However it shall always be possible to switch the main beam headlamp OFF manually."

- 6.1.9.3.5.** The main-beam shall be activated or deactivated relative to the ambient light conditions (e.g. switch ON during nighttime driving conditions, tunnels, etc. or switch OFF in daylight or otherwise sufficient ambient lighting levels;) according to the requirements of the table below (of Annex 12 b)

["Annex 12b]

AUTOMATIC ACTIVATION CONDITIONS OF The MAIN-BEAM HEADLAMPS <u>1/</u>	
Ambient light outside the vehicle <u>2/</u>	Main-beam headlamps
Less or equal than 100lx	shall activated
between 100lx and 1000lx	may activated
between 1000 lx and [7,000] lx	may deactivated
more than [7,000] lux	shall deactivated

- 1/ Compliance with these conditions shall be demonstrated by the applicant, by simulation or other means of verification accepted by the authority responsible for type approval.
- 2/ The illuminance shall be measured on a horizontal surface, with a cosine corrected sensor on the same height as the mounting position of the sensor on the vehicle. This may be demonstrated by the manufacturer by sufficient documentation or by other means accepted by the authority responsible for type approval."

6.1.9.3.6. [Compliance with the provisions in paragraphs 6.1.9.3.2. and 6.1.9.3.3. above shall be demonstrated by the applicant, by simulation or other means of verification accepted by the authority responsible for type approval. If necessary the illuminance shall be measured on a horizontally at the same height on the vehicle, with a cosine corrected sensor on the same height as the mounting position of the sensor on the vehicle. This may be demonstrated by the manufacturer by sufficient documentation or by other means accepted by the authority responsible for type approval.]

Annex 2

Proposals for Provisions to be introduced into Regulation 48
(Status of work following 8th meeting held jointly with GRE Experts on 25 February 2010)

Adaptive Main Beam

"2.7.28.7. **"adaptive main-beam" means a main-beam of the AFS that adapts its beam pattern to the presence of oncoming and preceding vehicles in order to improve the long-range visibility for the driver without causing discomfort, distraction or glare to other road users.**"

6.22.7.1.1. **The main-beam may be designed to be adaptive, subject to the provisions in paragraph 6.22.9.3., the control signals being produced by a sensor system which is capable of detecting and reacting to all the following:**

- **ambient lighting conditions;**
- **the light emitted by the front lighting, front light-signalling devices or retro-reflected light of oncoming vehicles;**
- **the light emitted by the rear light-signalling devices or retro-reflected light of preceding vehicles.**

Additional sensor functions to improve performance are allowed.

For the purpose of this paragraph, "vehicles" means vehicles of categories L, M, N, O, T, as well as bicycles, such vehicles being equipped with retro-reflectors, with lighting and light-signalling devices, which are switched ON.

6.22.7.1.2. **It shall always be possible to switch the main-beam, adaptive or not adaptive, ON and OFF manually.**

6.22.7.4. Automatic operation of the AFS

The changes within and between the provided classes and their modes of the AFS lighting functions as specified below, shall be performed automatically **without causing discomfort, distraction or glare**, neither for the driver nor for other road users.

The following conditions apply for the activation of the classes and their modes of the passing beam and, where applicable, of the main-beam **and/or the adaptation of the main-beam**.

Insert a new paragraph 6.22.8.3., to read:

**"6.22.8.3. If the main-beam is adaptive, a visual tell tale shall be provided to indicate to the driver that the adaptation of the main beam is activated.
This information shall remain displayed as long as the adaptation is activated.**

Paragraph 6.22.8.3. (former), renumber as paragraph 6.22.8.4.

Insert a new paragraph 6.22.9.2.3., to read:

"6.22.9.2.3. To verify, that the adaptation of the main-beam does not cause any discomfort, distraction or glare, neither to the driver nor to oncoming and preceding vehicles, the technical service shall perform a test drive in clear atmosphere x/ at all relevant speed, which comprises any situation relevant to the system control on the basis of the applicants description; activation, performance and deactivation of adaptation of the main-beam shall be recorded and checked against the data submitted by the applicant.

The overall performance of the automatic control shall be demonstrated by the applicant by documentation or by other means accepted by the authority responsible for type approval. “

6.22.9.2.3.1. The test course shall comprise:

Traffic conditions	Road type		
	Urban areas	Motor way	Country road
Single oncoming traffic Or Single preceding traffic In a frequency So that the system will be activated as well as deactivated to demonstrate the adaptation process. <u>x/</u>	[X]	X	X
Combined oncoming and preceding traffic situations,; In a frequency so that the system will be activated as well as deactivated to demonstrate the adaptation process. <u>x/</u>		X	X
Dense traffic;	X	X	X
Oncoming bicycle as described in paragraph 6.22.9.3.1.2.			X
Average percentage to sum of the full test course length	10	20	70
<p>The urban areas shall comprise roads with illumination and without illumination. The motorway and the country road shall comprise parts with two lane road, and parts with four lane road (or more); straight level parts with a length of more than 600m as well as curves and a country road with junctions, hills, dips and a part with a winding road.</p> <p><u>x/</u> Test engineers shall sit in the vehicle be tested to this requirement and in tone of the oncoming and preceding vehicles</p>			

Insert new paragraphs 6.22.9.3. to 6.22.9.6., to read:

"6.22.9.3. Adaptation of the main-beam

6.22.9.3.1. The sensor used to control the adaptation of the main-beam , as described in paragraph 6.22.7.1.2., shall comply with the following requirements:

6.22.9.3.1.1. The boundaries of the minimum fields in which the sensor is able to detect (light emitted or retro-reflected from) other vehicles according to paragraphs 6.1.7.1. and 6.1.7.2. above are defined by the angles indicated below. These angles are measured from the centre of the sensor aperture relative to a horizontal straight line through its centre and parallel to the longitudinal median plane of the vehicle.

- **Horizontal angles: 15° to the left and 15° to the right.**
- **Vertical angles: 5° upwards and 5° downwards ; or**
- **depending from the mounting height of the sensor**

Upward angle	5°		
Mounting height of the sensor (centre of sensor aperture above the ground)	Not larger than or equal 2m	Between 1.5m and 2.5m	Larger than 2.5m
Minimum Downward angle	2°	2° to 5°	5°

6.22.9.3.1.2. The sensor shall be able to detect on a straight level [flat] road:

- **an oncoming power driven vehicle at a distance extending to at least{ [300] [450] }m;**
- **a preceding power driven vehicle or a vehicle/ trailers combination at a distance extending to at least { [100] [200] }m;**
- **an oncoming bicycle at a distance extending to at least [50 150]m, with the illumination corresponding to a white lamp with a luminous intensity of 150 cd with a light emitting surface of at least [10] cm² and at a height above the ground of 0.8m..**

6.22.9.3.1.3. The adaptive main-beam shall be activated or deactivated relative to the ambient light conditions (e.g. switch ON during nighttime driving conditions, tunnels, etc. or switch OFF in daylight or otherwise sufficient ambient lighting levels;) according to the requirements of the table below (of Annex 12 b)

["Annex 12b]

AUTOMATIC ACTIVATION CONDITIONS OF ADAPTIVE MAIN-BEAM HEADLAMPS <u>1/</u>	
Ambient light outside the vehicle <u>2/</u>	Adaptive main-beam headlamps
Less or equal than 100lx	shall be activated
between 100lx and 1000lx	may be activated
between 1000 lx and [7,000] lx	may be deactivated
more than [7,000] lux	shall be deactivated

1/ Compliance with these conditions shall be demonstrated by the applicant, by simulation or other means of verification accepted by the authority responsible for type approval.

2/ The illuminance shall be measured on a horizontal surface, with a cosine corrected sensor on the same height as the mounting position of the sensor on the vehicle. This may be demonstrated by the manufacturer by sufficient documentation or by other means accepted by the authority responsible for type approval."

[6.22.9.3.1.4. Compliance with the provisions in paragraphs 6.22.9.3.1.3.. above shall be demonstrated by the applicant, by simulation or other means of verification accepted by the Technical Service responsible for type approval. If necessary the illuminance shall be measured on a horizontal surface, with a cosine corrected sensor on the same height as the mounting position of the sensor on the vehicle. This may be demonstrated by the manufacturer by sufficient documentation or by other means accepted by the authority responsible for type approval.]

***/ Good visibility (meteorological optical range MOR > 2, 000 m defined according to WMO, Guide to Meteorological Instruments and Methods of Observation, Sixth Edition, ISBN: 92-63-16008-2, pp 1. 9. 1/ 1. 9. 11, Geneva 1996) and clean lens.**

Annex 3

Proposals for Provisions to be introduced into Regulation 123
(Status of work following 8th meeting held jointly with GRE Experts on 25 February 2010)

Principal amendments relating to the Adaptive Driving Beam

Paragraph 5.7.2., amend to read:

- "5.7.2** **except in the case of the adaptation of the driving-beam either the passing beam or the driving beam shall always be obtained, without any possibility of remaining in an intermediate or undefined state; if this is not possible, such a state must be covered by the provisions according to paragraph 5.7.3. below;**

Introduces the concept of the adaptive driving beam and allows a state between passing beam and driving beam conditions.

Insert a new paragraph 6.3.6., to[6.3.8.] to read:

- 6.3.6.** **In the case of adaptation of the driving-beam function the system shall meet the requirements of the above paragraphs only when this driving- beam function is in the maximum position of activation.**

The driving beam will only meet the normal photometric provisions for a driving beam when it is in its maximum position of activation

- 6.3.8.** **During adaptation, the driving-beam function shall meet the requirements for all the cases of Right-Hand and Left-Hand traffic specified in Part A of Table 7 in Annex 3 to this Regulation. These requirements shall be verified during the type approval testing in conjunction with a signal generator to be provided by the applicant. This signal generator shall reproduce the signals provided by the vehicle and cause the gradual adaptation of the driving-beam and in particular shall represent the settings so that the photometric compliance can be verified.**
- 6.3.8.1.** **[If the driving-beam function meets the requirements in Part A of Table 7 in Annex 3 to this Regulation specified for line 1 to line 3 for oncoming and preceding vehicles (symmetrical beam) the relevant information shall be noticed in the communication document in Annex 1, paragraph 18.5.]**
- 6.3.8.2.** **[If the requirements of paragraph 6.3.7. above can be met either for the Right-Hand traffic or the Left-Hand traffic only, the relevant information shall be noticed in the communication document in Annex 1, paragraph 18.5.]**

Provides for the system to be designed for right hand traffic or left hand traffic only.

Annex 3, insert a new table 7, as follows:

Table 7: Requirements concerning the adaptation of the driving-beam according to paragraph 6.3.7. of this Regulation.

Note: The values will be adapted to a base of 13.2V instead of 12.0V

Part A

Test Point	Position / deg.		Max. Intensity **/ (cd)
	Horizontal	Vertical	
Line 1 Left Oncoming vehicle at 50 m in the case of Right-Hand Traffic	4.8°L to 2°L	0.57°Up	440
Line 1 Right Oncoming vehicle at 50 m in the case of Left- Hand Traffic	2°R to 4.8°R	0.57°Up	440
Line 2 Left Oncoming vehicle at 100 m in the case of Right-Hand Traffic	2.4°L to 1°L	0,3°Up	1300
Line 2 Right Oncoming vehicle at 100 m in the case of Left-Hand Traffic	1°R to 2.4°R	0,3°Up	1300
Line 3 Left Oncoming vehicle at 200 m in the case of Right-Hand Traffic	1.2°L to 0.5°L	0,15°Up	3800
Line 3 Right Oncoming vehicle at 200 m in the case of Left-Hand Traffic	0.5°R to 1.2°R	0,15°Up	3800
Line 4 Preceding vehicle at 50 m in the case of Right-Hand Traffic	1.7°L to 1.0°R	0,3°Up	1320
	>1.0° R to 1.7°R		1800
Line 4 Preceding vehicle at 50 m in the case of Left-Hand Traffic	1.0°R to 1.7°L		1320
	>1.0° R to 1.7°R		1800
Line 5 Preceding vehicle at 100 m in the case of Right-Hand Traffic	0.9° R to 0.5°L	0,15°Up	3900
	>0.5°L to 0.9°L		5000
Line 5 Preceding vehicle at 100 m in the case of Left-Hand Traffic	0.5° R to 0.9°L		3900
	>0.5°R to 0.9°R		5000

Line 6 Preceding vehicle at 200 m in the case of Left-Hand Traffic and Right-Hand Traffic	0.45°L to 0.45°R	0.1°Up	1140 0
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Part B

Test Point	Position /degrees */		Min. Intensity **/
	Horizontal	Vertical	(cd)
50R	1.72 R	D 0.86	3750
50V	V	D 0.86	3750
50L	3.43 L	D 0.86	2625
25LL	16 L	D 1.72	875
25RR	11 R	D 1.72	875

***/** Angular positions indicated for right-hand traffic

****/** The photometric requirements for each single measuring point (angular position) of this lighting function apply to half of the sum of the respective measured values from all lighting units of the system applied for this function.

Each of the lines defined in part A of table 7, in conjunction with the test points as prescribed in part B of table 7 shall be measured individually corresponding to the signal provided by the signal generator.

In the case that the passing beam, which meets the requirements of paragraph 6.2., is continuously operated in conjunction with the adaptation of the driving beam, the photometric requirements in Part B of the table 7 shall not be applied.

Photometric requirements related to right-hand and left-hand traffic and developed to be independent of technology