

**GRE IWG VGL - JUSTIFICATION FOR NON-REPLACEMENT OF THE 2000 lm CRITERION:**

IWG-VGL considered the 2000 lm criterion for separation between allowance for use of manual leveling device and mandatory use of automatic leveling device.

Technically there is justification to remove criterion but it will require better control of the headlamp aim of vehicles.

**HISTORY**

From the beginning of the application of the 1958 agreement there were no direct prescriptions for cut-off inclination even if the nominal value of inclination of - 1.0% was included in component (headlamps) regulations. During first 24 years of application of UN Regulations there was no levelling device requirements but the headlamps aiming was left to manufacturers or garage decision. However mechanical/optical headlamp test apparatus was invented and was used in garages and factories to set initial aim.

The idea to require vehicle load related leveling correction was presented and discussed (1975) in the EEC Directives frame where automatic devices were considered more suitable and their mandatory use was proposed.

At that time such devices were not technically mature. Consequently, vehicles manufacturers requested to temporarily use the manual device but transitional provisions were not defined.

In 1982 the requirements already existing in EEC Directive 76/756 (in the meantime amended by EEC Directive 80/233) were introduced in the new ECE Regulation 48.

Firstly were introduced ranges for initial aim and leveling independently on headlamp height, than two ranges for height with possibility of choice (0.8 to 1.0m) for manufacturers and finally similarly prolonged to 1.5 m (off-road vehicles N3G). There were basic solution based on the limited information available at that time comparing studies and analysis, this created large variations in road illumination and glare (see Appendix).

This "interim" situation changed in 1995 when gas discharge light sources were introduced; their high luminous flux (above 2000 lm) was considered to increase the risk of glare and as a result the automatic leveling was mandated for headlamps using these light sources.

In 2004 also halogen light sources having a luminous flux above 2000 lm were introduced in Regulation 37 while the use of LED light sources (having not defined luminous flux) started to be tested. GRE identified that the criteria for mandatory automatic headlamp levelling had to be moved from the gas discharge light source only to all the light sources which could produce more glare (H9, HIR1 ...).

At that time the value of 2000 lm was chosen as the simplest limit to require automatic leveling. Such criterion was never properly justified from technical and safety point of view.

**CONCLUSIONS**

IWG-VGL decided to propose the deletion of the present 2000 lm criterion because known studies and tests have demonstrated that this criterion is not justified.

IWG VGL came to conclusion that the important issue is to guarantee a minimum road illumination distance and the glare protection independently on load quantity and distribution in vehicle and properly define the range of cut-off inclination in relation to headlamp reference axis height.

The device or system to be used to fulfil these requirements should be basically effective and technology neutral, independently from the fact that it is a manual or automatic headlamp leveling device, an automatic suspension system or any other technical solution.

However it is important to guarantee proper cut-off inclination in required range. Therefore the solution (device) should minimize the human (driver) mistakes/misuse.

As the result of the 1st phase of IWG VGL work a new graph defining the aiming range in function of headlamp mounting height is proposed.

For the time being, the group VGL decided:

- Annex 5 remains unchanged to check if the vehicle is in compliance with the requirements;
- The automatic leveling device remains mandatory for AFS. However due to evolving technology this subject needs further studies during the 2nd phase of IWG VGL works.

## APPENDIX

### Historical review of UN regulation changes related to initial aim/leveling range.

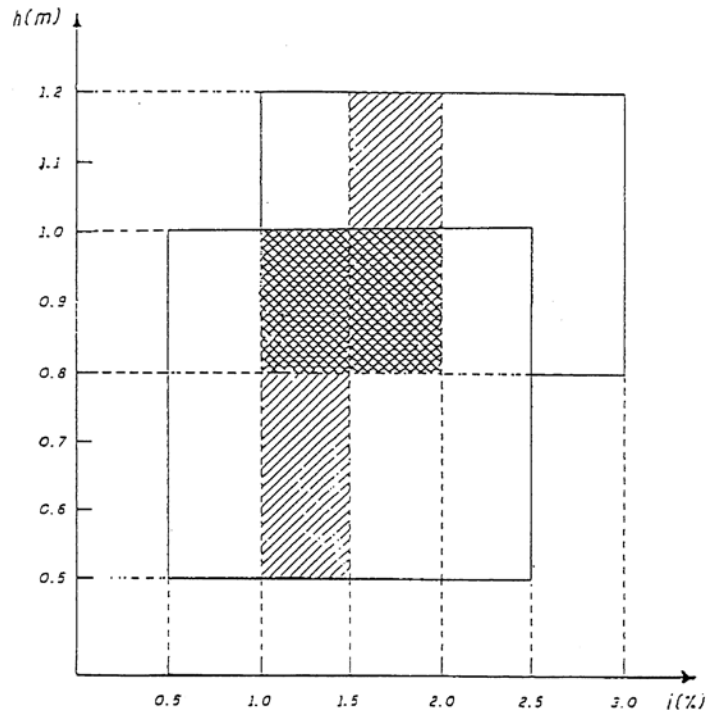
- **1 January 1982** Original version of UN Reg No 48.

"6.2.5.1. The vertical orientation of the passing beam measured in the static condition and in all the states of loading defined in „annex 5 to this Regulation shall remain between **-0.5 per cent** and **-2.5 per cent** without manual adjustment. In the "unladen" state, with one person in the driver's seat, this vertical orientation shall be initially set between **- 1 per cent** and **-1.5 per cent**. For each type, of vehicle the manufacturer shall specify this initial orientation, which shall be shown on a plate on each vehicle."

This was required by automatic means with (temporarily) allowance for manual device.

- **09 February 1994** UN Reg. 48 Revision 1

Addition two levels of height and inclination



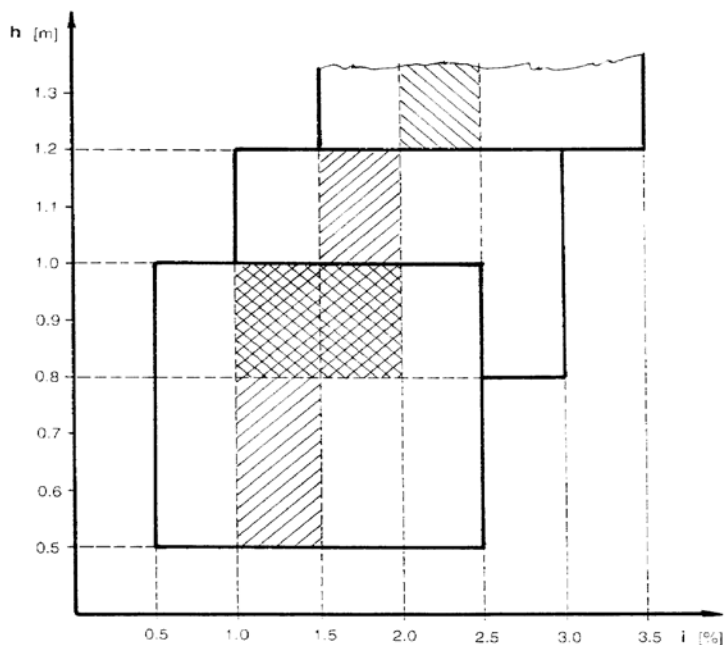
- **16 October 1995** UN Reg. 48 Revision 1 – Amendment 2

Paragraph 6.2.4.2, add at the end the following text (including also a new footnote \*/):

"....For category N3G (off-road) vehicles \*/, the maximum height may be increased to 1500 mm

Paragraph 6.2.6.1.2, add at the end the following text:

"....For category N3G (off-road) vehicles where the headlamps exceed a height of 1200 mm, the limits for the vertical inclination of the cut-off shall be between: -1.5% and -3.5%. The initial aim shall be set between: -2% and -2.5%" and replace the diagram by the following:



- **20 December 1995 UN Reg. 48 Revision 1 - Amendment 1**

Paragraph 6.2.9, add at the end a new subparagraph to read:

"...  
Dipped-beam headlamps **with gas-discharge** light sources shall only be permitted in conjunction with the installation of headlamp cleaning device(s) according to Regulation No. 45. 4/ In addition, with respect to vertical inclination, the provisions of **paragraph 6.2.6.2.2. shall not be applied when these headlamps are installed.**

- **26 February 2004 UN Reg.48 Revision 2 - Amendment 5**

"2.7.27. "**objective luminous flux**" means a design value of the luminous flux of a replaceable light source. It shall be achieved, within the

specified tolerances, when the replaceable light source is energized by the power supply at the specified test voltage, as indicated in the data sheet of the light source."

Paragraph 6.2.9., amend the second subparagraph to read (footnote 4/ not modified):

".....

Dipped-beam headlamps with a light source having an objective luminous flux which **exceeds 2,000 lumen** shall only be installed in conjunction with the installation of headlamp cleaning device(s) according to Regulation No. 45. 4/ In addition, with respect to vertical inclination, the provisions of paragraph 6.2.6.2.2. above shall not be applied."