

Proposal for Supplement 7 to the 01 series of Regulation No. 112

Notes:

1. This revision 1 of GRE-76-04 introduces a reference in paragraph 6.2.9. to “zones a), and b), as specified in the table below” and amends figure b) of annex 3.
2. If adopted, this proposal will update the proposal for amendments to Regulation 112 presented in ECE-TRANS-WP29-GRE-2016-34e.

I. Proposal

Paragraph 5.3.2.3., delete:

~~“5.3.2.3. The total objective luminous flux of all LED modules producing the principal passing beam and measured as described in paragraph 5. of Annex 10 shall be equal or greater than 1,000 lumens.”~~

Paragraph 5.3.2.4., renumber as paragraph 5.3.2.3.

Insert a new paragraph 6.2.9., to read:

“6.2.9. The total objective luminous flux of the filament light source as defined in Regulation 37 or the total objective luminous flux, measured as described in paragraph 5 of annex 10, of all LED light sources approved according to Regulation No. 128 and / or LED modules LED modules producing the principal passing beam shall be equal or greater than 1,000 lm.

If this requirement is not satisfied, the luminous flux in the principal passing beam shall meet the requirements in zones a) and b), as specified in the table below, when aimed according to paragraph 6.2.2. and measured after photometric stability has occurred:

Zone	Forward field	Luminous flux in the principal passing beam
a	30°L to 30°R and 15°D to 1°U	≥ 400 lm
b	30°L to 30°R and 3.5°D to 1°U	≥ 200 lm

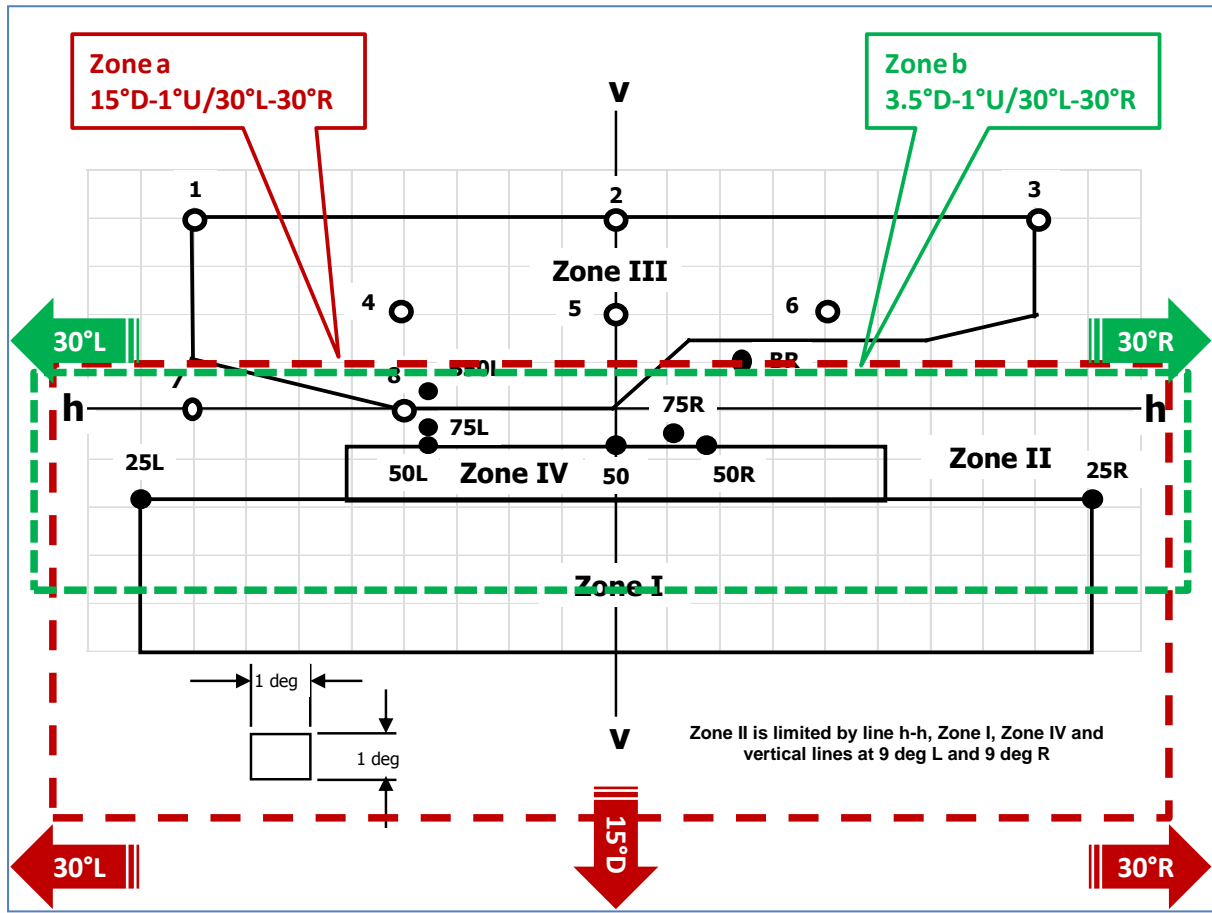
Paragraph 10.7., amend to read:

“10.7 The measuring points 1 to 8 from paragraph 6.2.4 and the measurement of the luminous flux according to paragraph 6.2.9 are disregarded.”

Annex 3, replace the existing figure b) to read:

“Figure B

Passing-beam for right-hand traffic



h-h = horizontal plane , v-v = vertical plane passing through the optical axis of the headlamp

The test point locations for left-hand traffic are mirrored about the VV line”

II. Justification

1. At its 73rd session, the expert from France proposed to delete a design restrictive requirement (ECE/TRANS/WP.29/GRE/2015/22 and GRE-73-26) which is not clearly justified in the Regulation. This proposal received comments from the experts of Germany and the Netherlands. The expert from Poland suggested a different approach on this issue (GRE-73-21). The Chair invited the experts from France, Germany, Netherlands, Poland, CLEPA and IEC to prepare a revised proposal for the next session.

2. Subsequently, at the request of its French experts, GTB carried out a study with the objective of developing a solution based upon the broad experience of its members producing principal passing beam headlamps type approved to UN Regulation No. 112.

3. The current requirement in paragraph 5.3.2.3 states

“5.3.2.3. *The total objective luminous flux of all LED modules producing the principal passing-beam and measured as described in paragraph 5. of Annex 10 shall be equal or greater than 1,000 lumens.*”

4. This requirement was introduced by ECE/TRANS/WP.29/2007/77 and was intended to ensure that headlamps equipped with LED modules would produce performances at least equivalent to those equipped with filament light sources producing an objective flux of 1000 lm (in the case of an H4). In 2007 when headlamps equipped with LED modules were in their early stages of development it was not apparent that more efficient optical systems would evolve to increase the utilisation of the available flux not achievable with headlamps equipped with filament light sources.

5. With the experience of producing many millions of LED headlamps it is clear that passing beams can be designed to use LEDs having an objective luminous flux of less than 1,000 Lm. These can provide an inexpensive solution for energy saving vehicles (e.g. the electrical

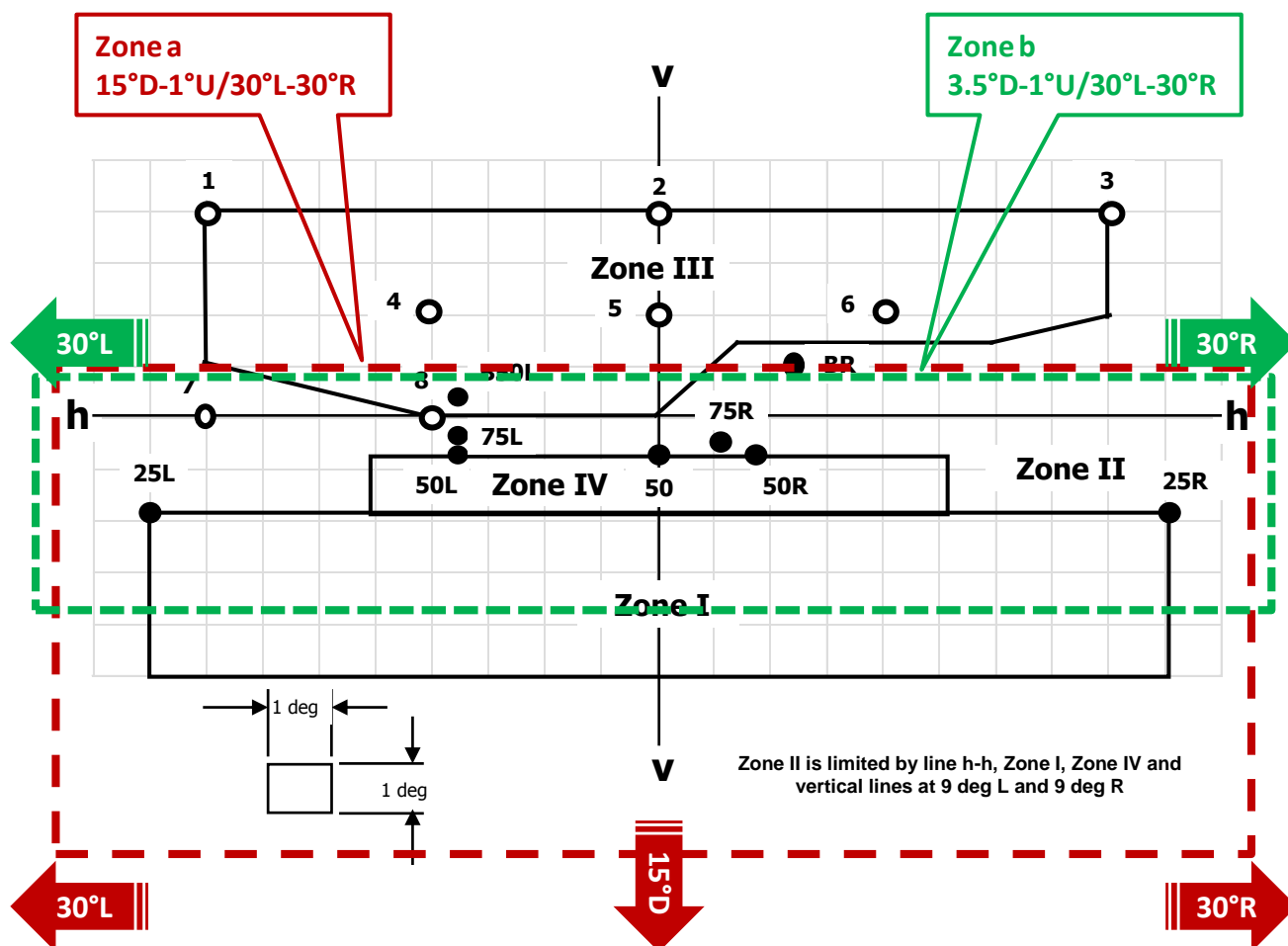
urban vehicles), while giving at least the same luminous intensity as other light sources. However, at previous sessions of GRE, some experts pointed out that this modification could lead to headlamps producing marginal performance despite the fact that they achieve the current photometric requirements of the Regulation. The current prescriptions of Regulation No. 112 in combination with approved filament light sources producing a minimum objective flux of 800 lm (H8) ensures that the passing beam produces a satisfactory level of illumination of the road

6. Based upon the approach proposed in GRE/2015/22 and GRE-73-26, GTB has investigated the specification of minimum levels of flux projected in critical zones of the passing beam distribution. This approach offers the possibility to remove the design specific requirement of a minimum objective flux and replace it with a technology neutral performance based requirement.

7. The result of the GTB study is to propose minimum projected flux requirements in two zones:

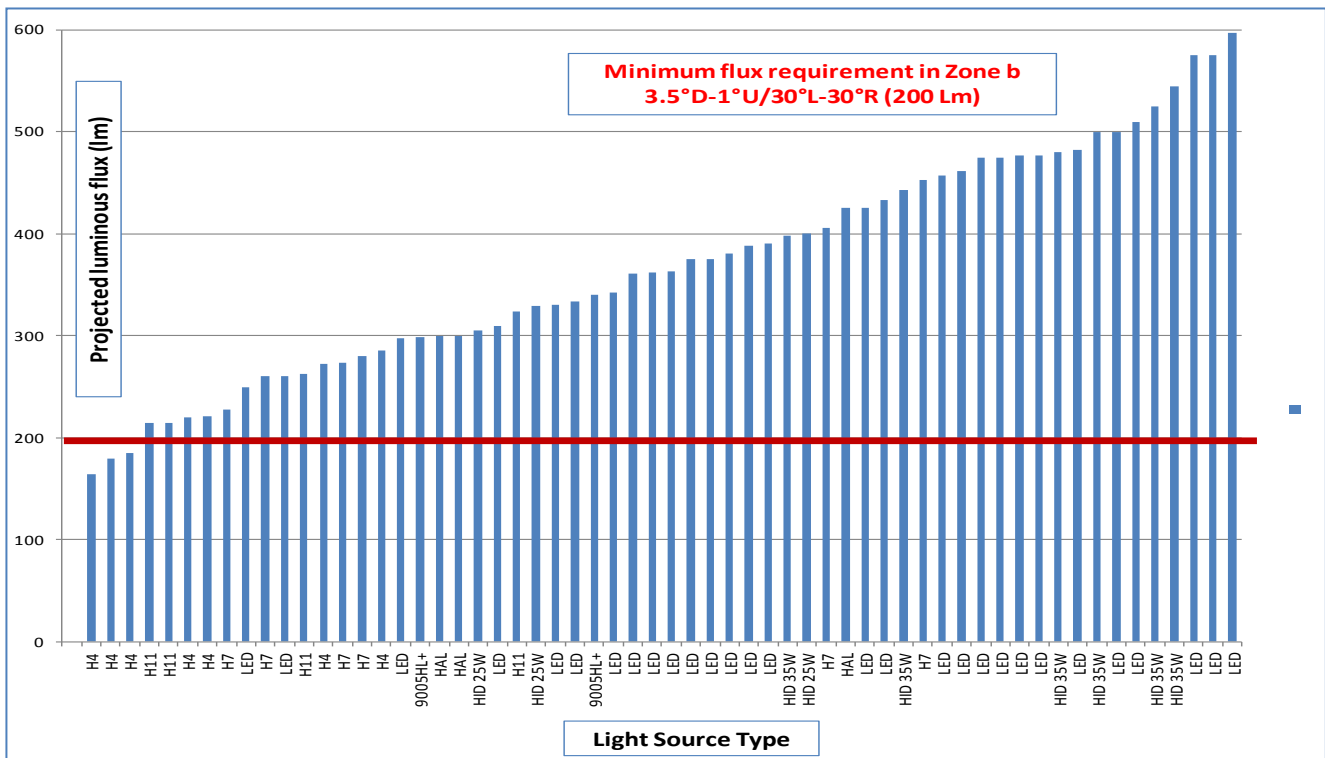
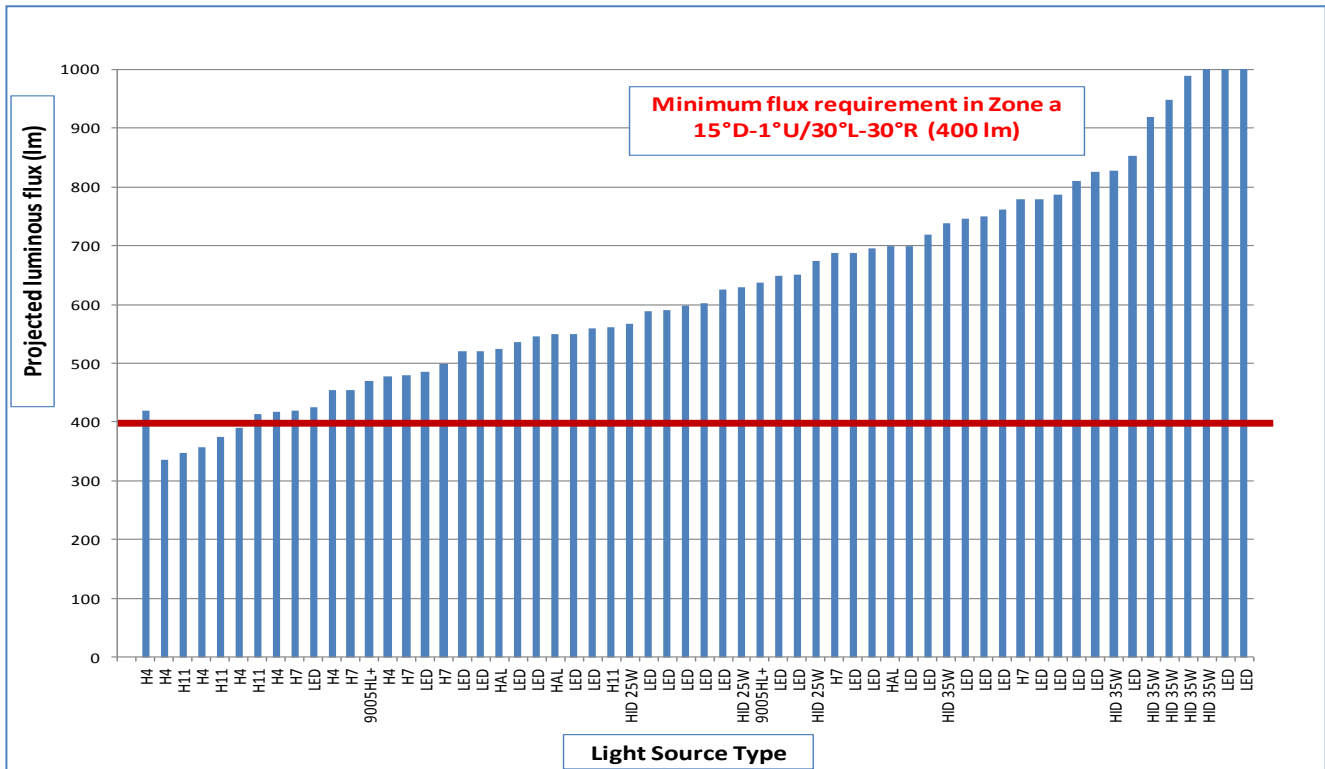
- a) $15^{\circ}\text{D}-1^{\circ}\text{U}/30^{\circ}\text{L}-30^{\circ}\text{R}$ to ensure overall adequate illumination of the road and
- b) $3.5^{\circ}\text{D}-1^{\circ}\text{U}/30^{\circ}\text{L}-30^{\circ}\text{R}$ to ensure sufficient range.

These zones are shown superimposed on the figure B of Annex 3 in the diagram below.



These two zones have been chosen as a compromise between ensuring a safe minimum level of performance and the need to find a solution that does not invalidate any headlamp technologies type approved according to the current regulation

8. A range of 60 passing beam headlamps equipped with various light sources, all in production and type approved to the provisions of Regulation No. 112, was measured to determine the actual flux projected into the zones a) and b) with the following result:

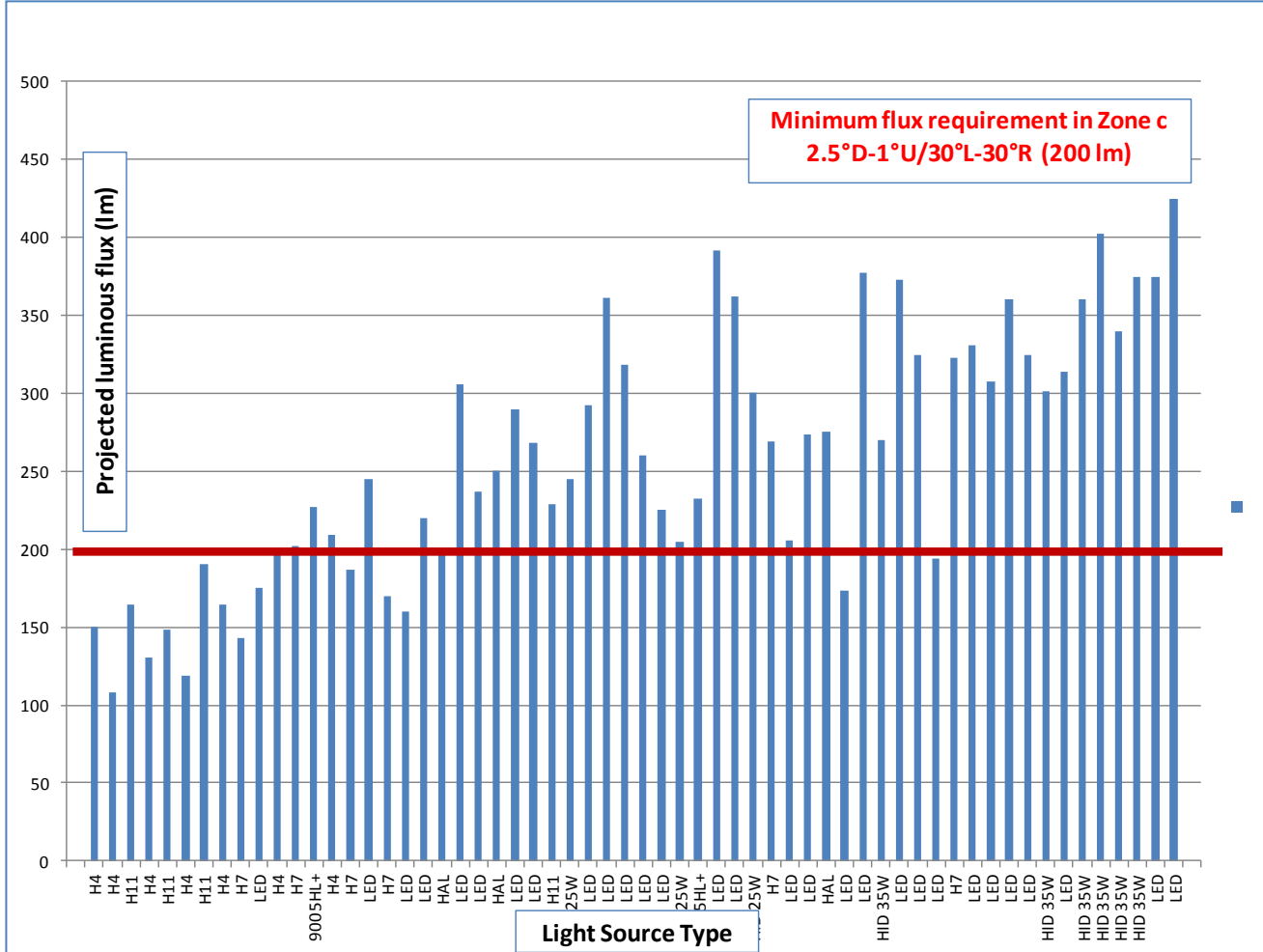


It can be seen that a small percentage of the passing beams tested will not comply with the 400 lm and 200 lm requirements but the GTB experts concluded that this would not present problems for manufacturers.

These results show that whilst all the LED passing beams meet the 1000 lm objective flux requirement this criterion has no significant influence upon the actual photometric performance of the headlamp. This design specific requirement in the context of current LED headlamps should therefore not be perpetuated.

- The minimum projected flux requirements in Zones a and b can be adopted as a technology neutral, performance based, requirement that will assure that the current performance levels achieved by type approved headlamps with filament light sources can be also assured with LED sources.

10. As part of the investigation, the same range of passing beams all in production and type approved to the provisions of Regulation No. 112, was measured to determine the actual flux projected into a smaller zone, 2.5°D-1°U/30°L-30°R,. This smaller zone, requiring the same minimum requirement of 200 lm, would result in more light closer to the passing beam cut-off and therefore producing an improved visibility range. The following diagram shows the effect of reducing the size of this zone upon the compliance of the passing beams currently type approved and in production. It can be clearly seen that approximately 20% would not achieve the 200 lm requirement in the smaller zone.



11. It should be emphasised that this study and its conclusions has the objective of introducing a solution assuring current levels of passing beam performance as an alternative to the design restrictive requirement of the 1000 lm minimum objective flux. This will ensure equal treatment of all headlamp technologies and encourage a wider application of the efficient LED technologies.

12. To address concerns expressed in GRE, that the minimum requirements for photometric performance in the current regulations may not be sufficient under modern traffic conditions, a more comprehensive study is required and this should be considered in the context of the Stage 2 of the GRE simplification plan.
