



Informal document No. **GRE-67-27**
(67th GRE, 26-29 March 2012,
agenda item 4(c)(i))

Comments on GRE/2012/21 (Lighting & Signalling WG)

Headlamp Initial Aiming

March 2012

- **GRE/2012/21 proposes changes to ECE R48:**
 - **To redefine the initial aim and static load-levelling requirements of dip beam headlamps in terms of headlamp range on the road rather than the current % downward inclination.**
 - **To add a requirement to measure glare values in loaded conditions as part of both Type Approval and CoP**
 - **To add a visible warning to the driver, defining what is the minimum visibility distance and what is a maximum safe speed when driving at night.**

Proposed Initial nominal aim to be 75m range

- Currently initial aim is specified as % downward inclination by the manufacturer, within a permitted range dependent on lamp height
 - Translated into ranges these are shown at right
 - Highlighted bars show typical **sports car**, **normal car** and **van/SUV** headlamp heights
- Proposal would increase nominal range for most cars
 - Result: most headlamps aimed higher than at present
 - Risks increased glare without effective mitigation.

Current nominal range (m)				
H(mm)	1.00%	1.50%	2.00%	2.50%
500	50	33		
550	55	37		
600	60	40		
650	65	43		
700	70	47		
800	80	53	40	
900	90	60	45	
1000	100	67	50	
1200		80	60	48
1400			70	56

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Proposed Initial nominal aim to be 75m range

- Requires a different aim for every vehicle headlamp centre height
- This results in
 - Increased complexity for manufacturer
 - Increased complexity for garages maintaining aim in service.
 - Increased complexity of annual inspection.

Proposal	
H(mm)	75m
500	-0.7%
550	-0.7%
600	-0.8%
650	-0.9%
700	-0.9%
800	-1.1%
900	-1.2%
1000	-1.3%
1200	-1.6%
1400	-1.9%

Tolerance with load levelling to be 50m to 100m range (6.2.6.1.2)

- Currently total load levelling tolerance is 2.0%
 - e.g 0.5% to 2.5% for h < 1000 mm
- Proposal is shown at right expressed as %.
 - Highest permitted aim with levelling unchanged at -0.5%
 - Corresponds to a reduction in load levelling tolerance for most cars of **60-75%**

Proposal				
	min angle	set	max angle	
H(mm)	100m	75m	50m	total tol
500	-0.5%	-0.7%	-1.0%	0.5%
550	-0.6%	-0.7%	-1.1%	0.6%
600	-0.6%	-0.8%	-1.2%	0.6%
650	-0.7%	-0.9%	-1.3%	0.7%
700	-0.7%	-0.9%	-1.4%	0.7%
800	-0.8%	-1.1%	-1.6%	0.8%
900	-0.9%	-1.2%	-1.8%	0.9%
1000	-1.0%	-1.3%	-2.0%	1.0%
1200	-1.2%	-1.6%	-2.4%	1.2%
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600	-0.6%	-0.8%	-1.2%	0.6%
650	-0.7%	-0.9%	-1.3%	0.7%
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- **In addition to the 6.2.6.1.2 50-100m range requirement , photometric requirements for glare at specified test points under all loading conditions are also required**
 - Requires on-car photometry:
 - R48 vehicle inspection does not include photometry
 - R112/98 component photometry does not include vehicle levelling .
- **1.3.2 of Annex 9 (CoP) has a similar photometry requirement for glare measurement.**
 - Also requires on-car photometry
- However, in practice a vehicle meeting **6.2.6.1.2** or **1.3.2 of Annex 9** would meet these glare specifications, so the above requirements are not necessary

- **Warning message**

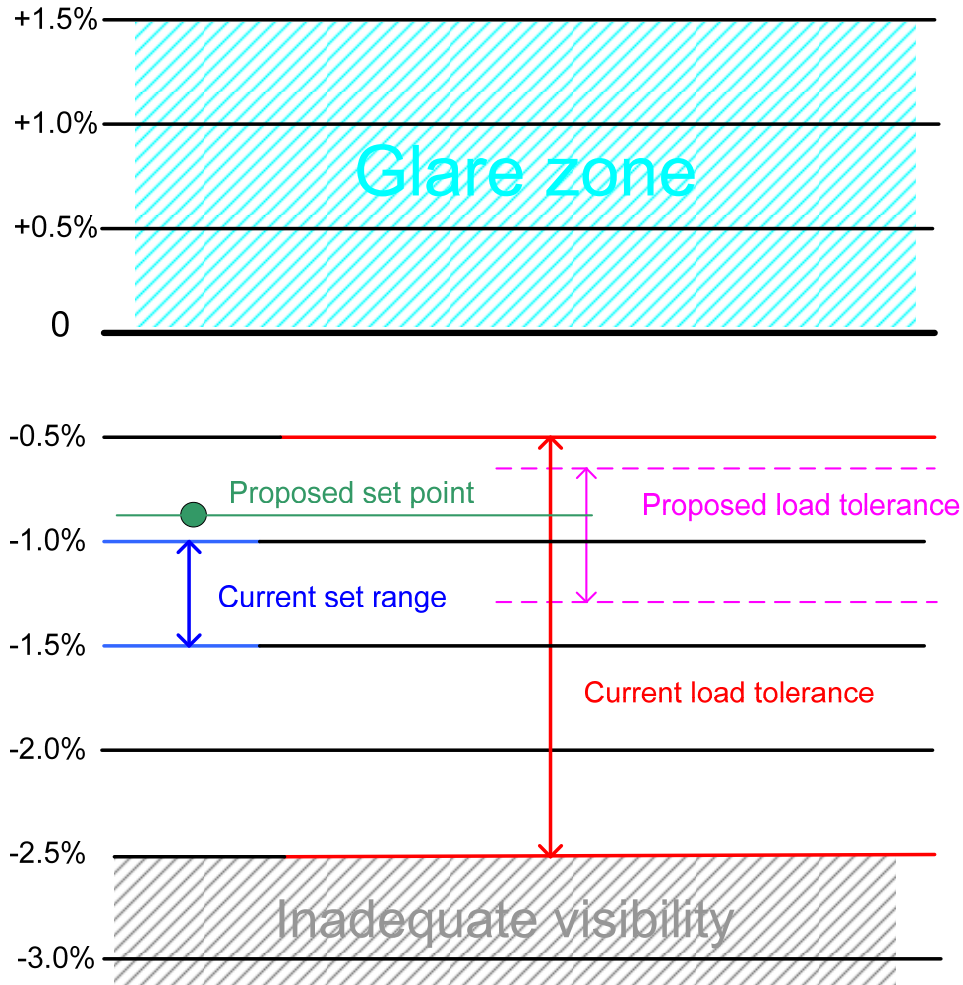
- While it is clearly advantageous that the driver is aware of the potential limits of visibility of headlighting systems, we do not believe R48 Type Approval is the appropriate place for this.
- The responsibility rests with the driver to judge what his visibility distance is in any circumstances; any information we give him must assist his decision, not make that decision for him.

Summary of GRE/2011/21

The effect of this aiming proposal on most passenger cars is to aim the headlamps higher, and to mitigate the higher glare risk by significantly reducing the load-levelling tolerance.

- **What is achievable tolerance reduction?**
 - The amount of variation in aim encountered in the field is described by the statistical capability of the production process.
 - Reduction of specified tolerance is only effective where the capability of a process shows less variation than the permitted tolerance.
 - Reduction in specified tolerance below the current manufacturer aiming process capability will result in increased non-compliance, not an improved product!

Example for 650mm high passenger car headlamp



- Reducing tolerance from current to proposed requires evidence that setting capability will permit this tightening.
- For capability, the standard deviation of setting needs to be sufficiently small to allow 95% of production to fall within the new reduced limits rather than the current limits.

- **Aiming/load levelling capability**

- Published reports¹ suggest current aiming capability is such that a significant proportion of vehicles on the road fall outside the current 6.2.6.1.2 limits
 - Reducing these limits may increase the number of non-compliances while not reducing glare in the field.
 - Raising the initial aim will increase the proportion of non-compliances that cause glare.
- At this time it may be unwise to adopt GRE/2012/21 without a greater understanding of manufacturing capability, and if the tolerance reduction necessary to prevent increased glare is achievable.
- With robust capability data, the proposal can be re-evaluated and possible alternative tolerances reviewed.

¹ Flannagan 2011, Flannagan Sivak & Schoettle 2007, Alferdinck & Patmos 1988

Conclusion

GRE/2012/21 proposed changes to ECE R48 (1 of 3):

To redefine the initial aim and static load-levelling requirements of dip beam headlamps in terms of headlamp range on the road rather than the current % downward inclination.

Result:

- Redefining the aim point will raise the aim for most passenger cars
- To prevent this causing increased glare, tolerances must be tightened :
 - Industry needs aiming capability data to identify if this tolerance tightening is practicable.
 - We suggest this is an appropriate project for a GTB Task Force

GRE/2012/21 proposed change to ECE R48 (2 of 3) :

To add a requirement to measure glare values in loaded conditions as part of both Type Approval and CoP

Result:

- Photometric measurement of a headlamp/vehicle system is not feasible.
However, since a vehicle that complies with the aiming requirements will in practice meet these glare requirements, we believe deleting this would not change the effect of the proposal.

GRE/2012/21 proposed change to ECE R48 (3 of 3):

To add a visible warning to the driver, defining what is the minimum visibility distance and what is a maximum safe speed when driving at night.

Result:

- While it is important that drivers are aware of the visibility limits of headlights, there are many other factors that affect visibility distance, therefore R48 is not the appropriate method to do this.

Thank You
