

**Polish comments to SLR-24-06**

## **GRE IWG-SLR – Stage 2**

### **GTB Approach to Glare and Visibility Issues**

This document reflects the outcome of the  
125th CE session in Kyoto (25 May 2018)

## Glare and Visibility Issues

1. Glare and Visibility concerns are not new
2. A passing beam will always be a matter of a **pragmatic compromise** between
  - the need to “see” and
  - the need to avoid unacceptable levels of glare to other road users.

Generally agree but compromise influencing safety should be clearly defined how much glare against how much visibility. It cannot be freely interpreted when it is base for legal requirements

This **pragmatic compromise** has to take into account manufacturing tolerances, aiming tolerances, varying road geometry and ambient conditions.

Clear data and values are needed how much each of mentioned factors is influencing visibility and glare. E.g. how much manual leveling device influence visibility and glare and how much automatic of best accessible technology and how it is related to the existing (or possible) manufacturing tolerances.

3. The current UN Regulations define the **pragmatic compromise** that was established by the introduction of UN Regulation No. 8 (headlamps equipped with Halogen light sources) on 15 November 1967.

This is not **pragmatic compromise** but **arbitral decisions** based on design existing that time (1958 -1967) which has no significant relation to present technology possibility (LED, free form optics, matrix, etc.) and driving needs like higher speed and much more traffic density.

This is based upon satisfying the requirements for :

- a minimum luminous intensity at the point 75R and,
- maximum luminous intensities in the Zone III and at B50L

This is simplification based on parabolic reflector design with double filament bulb with restricted flux and efficiency. For such design the light distribution even insufficient was highly predictable. It is irrelevant to today safety needs and technology.

4. There are no safety data that invalidate this **pragmatic compromise**

There are no safety data or any research results that validate this very simplified opinion.

There is very simple data informing that risk of accident during nighttime increase more than twice comparing day but risk of fatalities next 3 time more. Total risk of fatality is around 7 time higher at night.

There are University of Michigan (Flanagann) research showing that majority of night driving take place with speed not allowing for proper reaction regarding road illumination distance. Similar results were obtained by Motor Transport Institute based on different research base.

5. Research generally suggests that priority should be given to visibility

Inconsistency with previous sentence. There are many research showing insufficient visibility by many headlights (e.g. Technical University Darmstadt: Schmidt-Clausen).

6. All governments receive complaints about glare and choose to prioritise glare avoidance over visibility

Glare complaints is only part of the safety issue. It is easy perceived as very irritating. Contrary to glare the lack of visibility does not cause irritation and is not possibly to asses by not highly trained person without special tools. Typical driver believe that if he/she see bright road close to the car has good lights. This illusion is not causing complaints.

Lighting experts should be insensitive to political pressure based on mistakes.

7. Governments need to be able to react to glare complaints by demonstrating that action is being taken to overcome the problem

The politically motivated dummy actions always result in the loss of time, energy and authority

8. GTB needs to take a proactive stance

This internal problem of GTB.

### Background Information

1. The UN Regulations define the minimum requirements for safety

Safety factors (worst case) should be clearly defined by numbers like road illumination distance, minimum illuminance on road surface etc. Present UN Regulations in fact do not define minimum requirements for safety. 20 m road illumination distance guaranteed by it (Reg. 112 + Reg. 48,) not including possible additional tolerances cannot be treated as minimum for safety.

2. The current UN Regulations are based upon the **pragmatic compromise** (see page 2)

Not proven statement. The compromise was done but was not safety based. For today it is obsolete and danger. Need to be redefined based on real safety/performance factors.

3. For type approval purposes the **pragmatic compromise** shall be satisfied when the cutoff is aimed between specified limits.

This is too far going simplification and mistake in the assumption. Unfortunately present (parabolic design based) UN Regulations (112,98,123 etc.) give possibility to create beam pattern which not guarantee proper minimum road illumination and glare avoidance even cut-off is in prescribed position. Moreover cut-off is ambiguously defined and it is allowed the re-aiming procedure during type approval measurements. **Limits specified** in Reg. No48 for initial aim and leveling tolerances are inadequate to minimum road illumination distance and glare protection.

4. The cutoff is not a "hard line" but is a visual threshold in the intensity gradient.

5. The initial aim of the passing beam is important

4. and 5. is obvious. To what conclusions it leads for future performance based regulations?

6. There are manufacturing tolerances associated with the initial aiming that cannot be reduced

Manufacturing tolerances exists for all manufactured components and sets of it. It is nothing special. The question is regarding details. How big are road illumination distance changes in relation to today best accessible technology (e.g. dynamic automatic leveling, cut-off sharpness, optimum light distribution in the beam pattern) and if it is capable to compensate possible uncontrolled manufacturing tolerances.

7. A correctly designed and manufactured passing beam satisfying the type approval requirements will normally produce a performance in excess of the minimum requirements but there is a risk that in some cases more visibility will result in more glare complaints.

It is unclear. Details are needed. What does **correctly** mean? Correctly according contemporary technology (or best accessible e.g halogen, HID or LED) or just meeting present minimum type approval requirements? There are two different realities. What does “some cases” mean?

8. The need for measures to maintain the correct initial aim (Levelling systems to compensate for loading variations, etc.) is a separate issue, but should not be considered in isolation

It is not separated but closely linked issue. It works together in real road conditions and cannot be artificially separated.

9. The need to compensate for variations in road geometry is a separate issue, but should not be considered in isolation

It should be clearly explained and justified. There are much more factors influencing visibility and glare but if something is mentioned the data confirming importance should be prepared before. Otherwise it is redirecting attention to an unnecessary place.

## CONCLUSION

1. With conventional technologies the **pragmatic compromise** (see page 2) between glare and visibility remains valid

What does “conventional technologies” mean? It is clear “design base” for creating requirements. Does it suggest that regulations are not needed?

2. Less glare means less forward visibility

3. More visibility means more glare

2. and 3. work only in very restricted conditions when only one factor in the time is changed. E.g. cut-off inclination fir the same set of headlamps mounted in the same car. If you will compare two different sets of headlamps aimed identically you can have more glare with less visibility for one set and more visibility with less glare for another. It is **not sufficient argue** to **preserve existing requirements**.

#### 4. Glare and visibility CANNOT be managed in isolation

It is obvious true but the key point is to manage it properly.

##### **...examples extracted from document SAE...**

It is possible to extract small number of examples to encourage the support of the thesis. As explained for 2. and 3. above it is possible to prepare opposed examples as well. However nobody reasonable will question that visibility/glare balance is very sensitive to precision of aim of the headlamp in very narrow range of angle (-1.5% to 0.0% and above). Under and over it you will have no or very high glare appropriately - compare Kletwitz test results. Of course light distribution is the another important factor but not possible to describe in simple words like "pragmatic compromise" mantra.

#### 4. Glare and visibility CANNOT be managed in isolation

Of course true.

##### **GTB Agreed Approach**

As information regarding GTB position it is neutral. As suggestion the direction of IWG SLR work it might be at least controversial.

#### 1. Accept that the current approach to the type approval requirements for the passing beam remains valid.

It is unclear what does current approach mean.

- Manufacturers are producing good performing passing beams that are not being criticised for lack of visibility

Only part of manufactured headlamps are good performing. Exist the significant part of market (e.g. aftermarket) covered by type approved products of really insufficient quality. The lack of visibility is not possible to asses effectively by typical driver. Therefore it is no significant criticism. From the other side market demand for illegal HID and LED replacements of halogen bulbs clearly inform about practical feeling that many type approved headlamps are perceived as giving not enough visibility.

- We know that there are complaints about glare but there is no clear indication of the basis for these complaints

This is clear message that GTB should take more detailed attention to this phenomenon.

- The state of technology to produce a "traditional" passing beam having a cutoff is mature and there are limitations that cannot be overcome, e.g. manufacturing tolerances, maintenance of initial aim, road geometry, etc.

This is clear “design” reference instead of “performance”. The question is if it is properly regulated and how it should be regulated to protect road users against insufficient quality products?

2. For the purposes of Stage 2, Step 1 simplification we shall

a) maintain the current approach in the new RID regulation (not try to invent a better compromise between glare and visibility), and

This current approach is clearly “design” and allow industry to manufacture lower level quality headlamps besides unregulated “better” products.

b) improve visibility while maintaining the current assessment at 75R, Zone III and B50L in the new RID regulation, and

Maintaining current requirements will obviously not improve situation even cosmetic value adjustments would be done.

c) introduce the alternative to the 1000 lumen minimum requirement under development by WG-FL

It was confirmed that flux was one of several elements of parabolic design based requirements of 1958 Reg. No1. There is needed not alternative but new “performance based” way of road illumination devices description. Hopefully WG-FL is able to take this task.