

ECONOMIC COMMISSION FOR EUROPE
INLAND TRANSPORT COMMITTEE
World Forum for Harmonization of Vehicle Regulations (WP.29)
Working Party on Lighting and Light-Signalling (GRE)
Informal Group on Group on Visibility, Glare and Levelling (VGL)

Report of the 3rd meeting of the GRE Informal Working Group on Visibility, Glare and Levelling (VGL) CCFA, Paris Monday, 18th and Tuesday, 19th July from 09:00 to 16:00

		Working Documents
1.	Welcome and opening remarks	
Mr.Targosinski opened the meeting welcoming all the participants.		
2.	Introduction of participants and organisations	
	- Attendance forecasting	VGL-03-06
	- Participants at 3rd meeting IWG VGL	VGL-03-07
The list of all participants is available in document VGL-03-07.		
3.	Adoption of the agenda	VGL-03-02 Rev.3
The agenda was adopted.		
4.	Adoption of the report of the previous session	VGL-02-10
The report was approved.		
5.	Validation of the last proposal from Italy to update the ToR	VGL-03-01 VGL-03-01 Rev.1
<p>The chairman introduced the Terms of Reference with document VGL-03-01 which is an Italian proposal of revision of the ToR GRE-74-21-Rev.1 amended by the Annex 3 of the report of the GRE 74th (=VGL-02-01).</p> <p><i>Remind: The Terms of reference built during the 1st meeting of this group (GRE-74-21-Rev.1) have been approved during the 74th session of the GRE in October 2015.</i></p> <p><i>The report of the GRE-74, with the Terms of reference of the IWG VGL in Annex 3 of this report, has been approved during the 168th session of the WP29 in March 2016.</i></p> <p>The Terms of reference have been revised during the meeting → VGL-03-01 Rev.1</p> <ul style="list-style-type: none"> - In red modifications proposed by Italy according to discussions of informal meetings in Geneva after GRE-75 - In blue modifications according to the discussions during the 3rd IWG VGL meeting <p><u>The main points discussed during the meeting:</u></p> <ul style="list-style-type: none"> - §.16 & 17 revised by the Secretary after the 3rd meeting according to the GRE & WP.29 reports - Categories of vehicles: WP.29 asked to GRE to work on M & N categories. Nevertheless it is reminded that currently for other categories than M1 & N1, there are neither data nor technology for automatic device available - Phase 2 is deleted because too early to decide if it will be necessary and define precisely what to do. It will be updated after the outcome of the phase 1 - + see additional comments directly in the document <p>Conclusions: The group has to double check the modified ToR before submission to next GRE 76th session.</p>		

6.	<p>Technical discussions on</p> <ul style="list-style-type: none"> - GTB/OICA proposal (ECE/TRANS/WP.29/GRE/2015/5) & Explanation - Polish proposal (GRE-73-18) & Explanation - Vehicle tests <p>Additional documents not available before the meeting:</p> <ul style="list-style-type: none"> - Explanations PP for GTB OICA corrected during the meeting - M vehicles loading measure - N vehicles loading measure - Results of real load measurements - Explanation to GRE-73-18 part 2.1 for IWG VGL Paris 19.07.2016 corrected during the meeting <p>Ancient document:</p> <ul style="list-style-type: none"> - Compilation of all information available in GRE document provided by the TF CAVGS in 2014 	<p>GRE/2015/5 & GRE-73-06</p> <p>GRE-73-18+ Corr.1 & GRE-73-28</p> <p>VGL-03-03; VGL-03-04</p> <p>VGL-03-09</p> <p>VGL-03-10</p> <p>VGL-03-11 <i>(updated version not yet available)</i></p> <p>VGL-04-05 <i>(this document is a cleaned version of VGL-03-05, 08 & 12 + additional measurements on vehicles)</i></p> <p>GRE-71-32</p>
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1st day:

- General presentation by OICA of the GTB/OICA proposal GRE/2015/5
- General presentation by the chairman of the Polish counter-proposal GRE-73-18
- Explanation by the chairman of the document VGL-03-08 for the limit values of the diagram
- Presentation by the chairman of the documents VGL-03-09 and VGL-03-10 to explain the management of the increasing and decreasing vehicle loading
- Presentation by the chairman of the document VGL-03-11 of results on vehicle of category M1

2nd day:

- Following the discussions and questions of 1st day, presentation by the chairman of the document VGL-03-12 to explain his point of view on how to achieve a good visibility with his proposal of criterion for decision of the type of levelling device

Please see in Annex, notes on this technical part kindly sent by Jean-Marc Prigent with some addition from the Secretary

Conclusions:

The main points to be finalized:

- **Categories of vehicles:**
 - ✓ OICA/GTB: amendment only for M1 category of vehicle according to the data currently available after the Klettwitz tests
 - ✓ Polish proposal: all categories of vehicles
- **Diagram:**
 - ✓ Both: In line for the left side to the satisfaction of all attendees this meeting including some CPs
 - ✓ No consensus for the right side. Nevertheless for the time being, the CPs attending this meeting are more in favor of the Polish proposal
- **Loading conditions:**
 - ✓ GTB/OICA: 50% & 100% loading conditions only as criterion of decision for the type of levelling device in replacement of the 2000lm
 - ✓ Polish proposal: Increasing load from the front to the rear of the vehicle & increasing load from the rear to the front of the vehicle to find difference between minimum and maximum pitch angle. If it is less then doubled leveling tolerance two position manual correcting device may be used.
 - ✓ For GTB/OICA proposal current loading conditions in Annex 5 should be kept
- **Loading process:**
 - ✓ OICA/GTB: From the front to the rear according to the 50% and 100% of the technically permissible maximum mass to decide the type of levelling device to be used
 - ✓ Polish proposal: With step of 25kg or 5% of total permissible mass increasing up to technically permissible maximum mass in 2 steps. 1st step from the front to the rear and 2nd step from the rear to the front.

- **Criteria of decision for the type of levelling device:**
 - ✓ OICA/GTB:
 - With 50% of load, if outside of the box then automatic device mandatory
 - Then if with 50% of load the cutoff remains within the box without having to use any leveling device, the 100% of load is checked. If outside of the box a levelling device has to be installed and at least a manual levelling device according to the new diagram/box.
 - ✓ Polish proposal: if max. and. min pitch difference is more than 2 times of the box tolerance calculated following the process explained above, then automatic device mandatory, otherwise two position manual levelling device possible
 - **Criteria for visibility:**
 - ✓ OICA/GTB: study from TC4-45
 - ✓ Polish proposal: the same minimum road illumination distance for all vehicles independently on loading and headlamp height; current proposal of 50m
 - **If manual device:**
 - ✓ OICA/GTB: possible to have several positions as today
 - ✓ Polish proposal: one step
 - **Additional comments:**
 - ✓ OICA: Industrial constraints have also to be considered
 - Type-approval
 - Design years in advance, when real vehicles are not yet available
 - Varieties of declinations for one model
 - Discrepancies between simulation and real vehicles
 - Industrial tolerances
 - ✓ OICA/GTB still has to be explained in depth, in presence of experts who realized the work
 - ✓ visibility vs. glare → what preference?
 - For the time being, it remains difficult to find a consensus on all this points
 - **3 main points have to be considered by the group**
 - ✓ Conditions and process for loading
 - ✓ Diagram with limit values (left for glare/right for visibility)
 - ✓ Criteria for decision of the type of levelling device
- Conclusion: A status report will be done at next GRE session in October 2016 after 4th meeting of the IWG VGL on October 4, 2016 (location to be confirmed)**

7.	Any Other Business	
No other business		
8.	Next steps	
<ul style="list-style-type: none"> - ToR to be double checked - Polish and OICA/GTB proposals to be further discussed to find a consensus - Presentation of the status of the group to be prepared for next GRE 		
9.	Next meeting(s)	
<ul style="list-style-type: none"> - Tuesday 4th October 2016 in conjunction with the IWG SLR – Location to be precised (Brussels, Geneva) - Monday 24th October 2016 in conjunction with next GRE? To be checked if possible - 08-09th February 2017 in Warsaw (ITS) 		
10.	Closure	
Mr.Targosinski thanked all participants for their fruitful contribution and closed the meeting.		

Working documents listed in the agenda are available via the INTERNET:
<https://www2.unece.org/wiki/pages/viewpage.action?pagelD=26903055>

ANNEX – NOTES ON THE TECHNICAL PART §.6 BY JEAN-MARC PRIGENT

And in Italic additions from Secretary

Discussions:

- **Introduction from Thomas Goldbach about the 'GTB/OICA proposal GRE/2015/05:**

General overview with the main amendments: some amendments in the definitions part with addition of the N1 derived from the M1

Paragraph 6.2.6.1.1 with introduction of the M1 category + N1 derived from M1 – Experience with Klettwitz tests only for M1/N1

Paragraph 6.2.6.1.1.2 new diagram for these categories of vehicles

Paragraph 6.2.6.2.1 new requirements with the 50% loading condition & the 100% loading condition to be able to choose the type of levelling device

Paragraph 6.2.9 Same 2000lm criteria whatever the type of the light source

He already included the amendment for LED headlamps without the full mandatory of auto levelling device (in a revised version of GTB/OICA proposal).

Paragraph 6.2.6.1.2 with amendment in addition with the new threshold

Annex 5 with loading conditions and introduction of the 50% loading condition and explanation of the loading process

He also took into account that all loading conditions from Annex 5 have to be fulfilled in AFS section.

He thinks that the Annex 5 is the main requirement from GTB/OICA proposal.

The Chairman proposes to compare the GTB/OICA document and the Polish proposal GRE-73-18 corrigendum 1 (available on the UNECE website).

- **Presentation by the Chairman of the review of polish revised proposal GRE-73-18 Corr.1 for this meeting:**

Paragraph 6.2.6.1.1. to comply to GRE: M and N categories and not *only* M₁ & N₁.

Paragraph 6.2.6.1.1.2. *modification of the reference with a new graph. This is more realistic to take the reference axis of the headlamp.*

The graphic is based on the 50m visibility. It is not the same as the previous one.

To remove the whole paragraph 6.2.6.1.2 *because he proposes all categories of vehicles.* The graph is really not performance oriented.

Paragraph 6.2.6.2.1. see 6.2.6.1.1.

Paragraph 6.2.6.2.1.1. It is based on the request from **the Chairman** to measure some vehicles according to the document **VGL-03-04**. After measurement and comparison of the Maximum and the Minimum values, the difference should not differ more than 2 times what is required in the paragraph 6.2.6.1.1.2.

Annex 5:

1. *mass can be different of 75kg*

2. *full trunk with modification – lowest and highest inclination modified with a table for example with a graph*

2.1.1.2. *replacement of the 50% loading condition by a lowest dipped beam inclination with the process to load the vehicle from the front to the rear and then from the rear to the front – also according to the location of the luggage compartment*

2.1.1.3. *then highest inclination*

2.2.1 *idem with lowest and highest inclination for unladen vehicles*

Annex 6 variation replaced by characteristics

§.1.3.2. *deletion because of the different categories of vehicles*

Too quick explanations. Then moving to the explanations for the GRE-73-18 (VGL-03-08):

Slide 3 shows the different proposals together. So his new solution is to combine the both proposals together. The right side has a minimum requirement to illuminate at 50m from Poland. On the left side, this is the GTB/OICA proposal without changes.

Slide 6 shows the idea of **The Chairman** with $\Delta D = D_{Max} - D_{min}$.

On slide 7, we can see that with this resulted line, there is no need of levelling device at all. On the other following slides, we can see on how to define the need of auto levelling device or manual one.

The way to load is described in the two presentations for M and N categories.

Refer to the two presentations **VGL-03-09 & VGL-03-10**.

Introduction of load per step of 25kg up to 75kg to change the seat to be loaded or 5% - 2 solutions possible at the discretion of the manufacturer for the lowest from the front to the rear and for the highest from the rear to the front – so potentially not all seats will be full

Remark from **Gerhard Maurer**: complicated - also not realistic with the 2 times of tolerance

Phil Bailey: if we need to remain in the box, do we need to differentiate manual and automatic levelling?

Jean-Louis Chazalotte: for approval, there is no load compartment – technically a lot of difficulties – not easy to put gradually load – needed of very specific equipment – mass max on the rear axle and potentially nothing on the front to have the worst case – worst case is selected because of a lot of different configurations – need to be able to select the right vehicle –

Jean-Louis Chazalotte is concerned to apply same procedure for M and N categories. Usually they are loading the small trucks according to the worst case to evaluate the need or not of levelling device.

Thomas Goldbach: type-approval and design – no specific vehicles – we have to decide earlier with simulation and not so easy – easy with vehicle in the street but not for vehicles in development

Thomas Goldbach clearly insists on the fact that we are talking about type approval but in development stage, there is no vehicle available to perform and estimate the loading compartment of the future vehicle.

Review of the Results of real load measurements for M1 vehicles presentation made by The Chairman:

There are no names or categories described in the list to avoid any competition issues. All vehicles were equipped with manual levelling device. Height from ground to the axis (filament position)

I_0 calculated which will nominal aim for headlamp according to the height

L_{min} is value which is for lowest road illumination

The I_0 value is for a visibility distance of 75m. We can check in the results that if:

- Height \leq 700mm \rightarrow initial aiming at 0.9%
- 700 < height < 800 \rightarrow initial aiming at 1%.
- 800 \leq height \rightarrow initial aiming at 1.1% to 1.2%.

I missed one point but it seems that most of vehicles measured can reach the requirement without the 1 step correction of manual levelling device.

Naono san asks some more explanations about I_0 and I_H as it is not clear, to explain this table and signification.

Vehicle	HL Height (m)	I_{min}	I_{max}	$I_{max}-I_{min}$	I_0	$L_{min}(m)$	I_H
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Phil Bailey: for our group we need a strategy to know when we are outside the box, do we need an automatic or manual levelling (one stage)

The Chairman is referring to an old document **GRE-71-32** (slides 16 to 20) – dividing the value for 50m and nominal aiming at 75m. The 75m visibility line is the I_0 .

I_H is using the resulting interval of $(I_{max}-I_{min})/2$ then it is compared to I_0 : result is the maximum deviation we can accept without levelling device.

If the I_H value is negative (only 4) then with a 1 step manual levelling device, we are back in the requirement and no more need of correction.

Long discussion between **Thomas Goldbach** and **the Chairman** on the application of this solution for Trucks. According to **Tomasz Targosinski**, the trucks are more glaring due to the 24V and size of filaments...

Jean-Louis Chazalotte is not convinced that it will be possible to apply this solution to all trucks.

Christian Pichon thanks for documents. We need time to analyze these documents. For buses for example it is very difficult. We do not need to go per 25kg steps. All levelling devices are designed to go down and not to go up for instance when you have more and more passengers with an inclination down on the front.

In table we must add initial adjustment \rightarrow where does I_H go? Why do we change all the configuration of loading of charge?

One step adjustment it is to return in the past to be able to adjust according to the real situation on the road \rightarrow it could be a danger and we want to keep an adjustment at least at the same 'good' level than today and the impact will be to be lower as possible to be sure to be able to meet the requirements with only one step of levelling

Ergonomy also important to the driver to have information –

He is thinking how realistic the application of this method could be in case of busses and some trucks.

He also claims about the curve going down for the first steps of measurement that at least increase the difference between I_{\max} and I_{\min} .

It could be interesting to add on the graph the 75m line to be able to see where it is matching and when it is going on the wrong direction.

France doesn't want to change the loading conditions as already described in the Regulation N°48 at the time being.

Only one step manual levelling device is maybe a danger for glares.

Tomasz Targosinski explains that the manual levelling devices are efficient only on positions 1, 2 and maximum the 3rd position, at the time being. The other positions are really aiming too low on visibility point of view.

The Chairman confirms that it is measurements (**VGL-03-11**) done only by his laboratory. No carmakers participated to this study yet. He is still waiting for some measurements.

Next day: presentation of another file (**VGL-03-12**) made by **the Chairman** to explain the I_0 and I_H columns. File: explanations to GRE 73-18 part 2.1 for IWG VGL Paris 19.07.2016.pdf (**VGL-03-12**)

It is not example 17 but 16 from the Results of real load measurements file → **corrections done in VGL documents**.

There is a problem of understanding from **Gerhard Maurer** and **JMP** about the fact that example 16 is starting from -1.8 to 0.6 but on the graph on slide 7, the interval is moved from -2.1 to 0.3. We cannot understand why?

It seems to be an example using the right column values from **interval** + I_0 to I_H of example 16. Then he is moving artificially the **interval** according to the need for his explanations.

According to **Derwin Rovers**, the following slides are mainly during development design.

Gerhard Maurer raises the point that the 2 steps manual levelling device will be operated when the beam is slightly up due to a small charge, then we go lower to 50m line so reducing the visibility. **Derwin Rovers** understands this point but he thinks it is also applying to the actual manual levelling device with more positions.

The important point is that the driver should know when to apply the different steps of the manual levelling device.

On slide 13, he is taking the values from example 9. (**Interval** to I_H).

On slide 15, he put the initial aiming at the 55m point and then the interval is on the left. Then when using the 2 steps (0 and 1) manual levelling device, the left limit comes back into the requirements of the proposal.

Gerhard Maurer is still questioning himself about the suspensions' concern. According the different suspensions' hardness, it is difficult to apply this Polish proposal.

It seems that the examples given by **Tomasz Targosinski** show that every headlamps should **be initially aimed at 50m** then the correction is applied in case of loading conditions. **Thomas Goldbach** also comes to this conclusion.

Françoise Silvani reminds the group about the industrial constraints and the tolerances resulting to those constraints.

Added to the suspension issue, **Pauline Lejeune** also raises the problem of difference of engines.

Françoise Silvani expresses clearly that it is impossible to reach the requirements shown on slide 15.

Pauline Lejeune expresses again that it is nearly impossible to predict this 5 years in advance and to take into account all the possible combinations of vehicle types/engines/suspensions... and also on same vehicles with same level of definition, there will be variations due to manufacturing process. High tolerances help to take every case into account.

Naono san thanks for the job done on the evening by the Chairman and despite the concern of small tolerances due to the huge possibilities, he can see a good step to the solution. However he needs to understand how to define when it is needed no levelling device, then manual device and finally the automatic device. Supported by **Gerhard Maurer**.

Jean-Louis Chazalotte expresses that for trucks cases, it is really important to have clear manner to identify the worst case and it shouldn't rely on real measurements but in simulation in advance.

Pauline Lejeune explains that her company made some simulations with different structures/engines of the same model of vehicle with one specific loading condition and the results were a discrepancy of 0.6%. This is not taking into account the tolerances of the manufacturing. She concludes that it is not possible to simulate accurately all the possible different versions of same vehicles during the development phase.

Derwin Rovers needs to understand the problem from Industry to be able to go forward. Is the concern from tolerances or the fact that with this proposal, without physical vehicle, it is difficult to know if it is needed to install automatic or manual levelling device.

→ This proposal needs behaviour knowledge to be able to predict the device without physical vehicle.

Derwin Rovers is, after the explanations from Thomas Goldbach, thinking that the GTB/OICA proposal is feasible even with some simulations. For the Polish proposal, it is not the same. So he proposes to come back on the GTB/OICA study.

Supported by **Antoine Pamart**.

Antoine Pamart asks to have more explanations about the 50% loading condition and how to define the criteria when it is out of the box.

Thomas Goldbach is supporting that this is the key point of the both proposals (GTB/OICA and Polish). This should be based on carmakers' experience and then some tuning should be done in future on the real vehicles.

Derwin Rovers understands that it is a huge work to get the accurate simulation but governments need to understand what the carmakers' problem is to predict. It seems to him that the GTB/OICA proposal seems more feasible for carmakers than the Polish proposal.

Thomas Goldbach acknowledges that the proposal was not double check with his engineers on a simulation point of view (GTB/OICA one).

Thomas Goldbach reminds the explanations on yesterday. The diagram has been built to find a compromise between glare & visibility and that the 50% loading condition is based on some real measurements in Klettwitz with M1/N1 experience and not for other categories of vehicles and these categories have to be considered. The box was defined after some measurements of real headlamps and the Klettwitz results. The left vertical limit was to avoid complain on having some aiming over 0% (slide 5 of GRE-73-06)

Phil Bailey appreciates the Polish proposal as it is more what the headlamp should do. The GTB/OICA proposal is the same but including the industrial tolerances.

Thomas Goldbach reminds that the Polish proposal requests the initial aiming for all headlamps at 50m (visibility).

Just as a reminder, **GRE-71-32** is explaining the box and **GRE-73-06** is full explanations of the GTB/OICA proposal.

Derwin Rovers, after checking the right curve from GTB/OICA proposal in GRE-71-32, expresses that this one is taking into account the full beam and especially the visibility over the cut-off line.

After some explanations from different experts in the room, the 50m from Poland is the minimum requirements to be fulfilled for the type approval. The GTB/OICA proposal is based on accurate headlamps and can be aimed more down than 50m and comply with a good visibility range.

Antoine Pamart understands that it could be better to provide better illumination on smaller distance (less than 50m) than a longer distance. Is it correct? He is in favour to use the Polish right limit.

Derwin Rovers is expressing that The Netherlands will prefer visibility. It is not the case of all contracting parties that will privilege the management of glare.

Antoine Pamart is thinking we can slightly modify the green limit from Poland to the right to be in between GBT/OICA proposal and Polish one.

Tomasz Targosinski asks to show the slide 31 of GRE-71-32 to make the evidence that different headlamps have very similar results for aiming lower than 50m. So what could be the benefit for a very good performance headlamp?

Pauline Lejeune reminds that the GTB/OICA proposal is a compromise of different experts from industry and governments point of views.

On the screen, **The Chairman** shows a line starting from the point 0:0 passing by 1.5:0.5 then the result is 3.8:1.2 (31m).

Naono san thinks that the green line from initial Polish proposal is the correct one (50m).

Derwin Rovers fully supports the line starting from 0:0. Now it is needed to establish the value (50, 40 or 30m). He suggests that the line should cross the top right corner (at 1200mm) of the GTB/OICA right limit. It could be a good compromise for all parties.

Françoise Silvani cannot support the Polish proposal and they (OICA) understand that it is needed to find another solution.

Pauline Lejeune thinks that some mounting heights will have more flexibilities than others, if we use the line starting from 0:0.

Derwin Rovers has the feeling that both proposals have some justifications but the Polish one is much more stronger than the GTB/OICA one, in regard of GRE and WP.29. Support from **Antoine Pamart** and **Phil Bayley**.

Discussion starts between **Françoise Silvani** with the argument of low number of accidents due with loaded vehicles during night drive and **Phil Bayley** about the fact glaring on hundreds of kilometres other drivers is a concern.

Phil Bayley raises the headlamp should stay in a box and this is the GRE task. Supported by **Derwin Rovers**.

Françoise Silvani cannot see what the compromise could be. We need to perform additional tests to get some data but it is needed guideline to perform the test.

Naono san summarizes that the Polish proposal is the most supported one from Contracting Parties and also this is not the final step.

Conclusion on the box discussion:

The Government representatives, present in the room, are in favour of Polish proposal.

The OICA representatives are in favour of GTB/OICA proposal for the right side of the box.

The left side of the both proposals is a common agreement to use the GTB/OICA one.

Procedure for the tests to be performed:

The Chairman asks if the 50% loading condition from GTB/OICA proposal is good or the one proposed by Poland?

Gerhard Maurer is questioning himself due to the suspensions level. **Tomasz Targosinski** thinks that both proposals are not taking into account the suspensions but the results due to loading conditions.

Derwin Rovers proposes to check the both procedures and extract the good idea(s) of each to define a better one.

OICA tries to argue about the 50% loading condition against Phil Bailey arguments on where the weight is put in the car or shared.

Naono san thinks that Polish proposal has two aspects for treatment of glare / visibility: there are opposed – we should have the two ways' treatment instead of making preference to glare or visibility. He can in principle support the proposal but it is needed to discuss about details especially on the feasibility point of view.

Naono san, after explanations from OICA, still cannot see from where the 50% loading condition is coming.

Long debate on both positions (OICA/DfT).

Responding to a concern from **Phil Bayley** about the non-use of the manual levelling device, **Pauline Lejeune** replies that it is a concern to **GRSG** with Regulation N°121 to give the information to the driver (colour, sign,...).

The Chairman tries to summarize the discussion: the first step is really to get the right box condition and then to work on the value(s) to define when we should have a manual, automatic levelling device or nothing.