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**Economic Commission for Europe****Inland Transport Committee****World Forum for Harmonization of Vehicle Regulations****Working Party on Lighting and Light-Signalling****Sixty-fifth session**

Geneva, 28–31 March 2011

Item 5(g) of the provisional agenda

**Collective amendments—Regulations Nos. 48 and 112****Proposal for Supplement 8 to the 04 series of amendments to Regulation No. 48 (Installation of lighting and light-signalling devices)****Submitted by the expert from the Working Party "Brussels 1952"\***

The text reproduced below, relating to proposed amendments to Regulation No. 48, was prepared by the expert from the Working Party "Brussels 1952" (GTB) to adapt the definition "Light Emitting Diodes (LED) Modules" in line with technological progress and to introduce into the Regulation provisions for the LED light sources according to the draft Regulation (Regulation No. XXX: ECE/TRANS/WP.29/2010/44 and Corr.1). An associated draft amendment to Regulation No. 112 is submitted in ECE/TRANS/WP.29/GRE/2011/21. The modifications to the existing text of the Regulation No. 48 are marked in bold for new or strikethrough for deleted characters.

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\* In accordance with the programme of work of the Inland Transport Committee for 2010–2014 (ECE/TRANS/208, para. 106, ECE/TRANS/2010/8, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

## I. Proposal

*Paragraph 2.7.1.1.3.*, amend to read:

"2.7.1.1.3. *"Light source module"* means an optical part of a device which is specific to that device. **It contains one or more non-replaceable light sources and it may optionally contain one or more holders for approved replaceable light sources** ~~is only removable from its device with the use of tool(s). A light source module is so designed that regardless the use of tool(s), it is not mechanically interchangeable with any replaceable approved light source.~~"

*Paragraph 2.7.1.1.7.*, amend to read:

"2.7.1.1.7. *"LED module"* means a light source module containing as light sources only LEDs. **However it may optionally contain one or more holders for approved replaceable light sources.**"

*Paragraph 5.23.*, amend to read:

"5.23. Lamps **approved with light source(s) according to Regulation No. 37 and/or according to Regulation No. XXX** shall be fitted in a vehicle in such a way that the light source can be correctly replaced without the need for expert assistance and without the need for special tools, other than those provided with the vehicle by the manufacturer. The vehicle manufacturer shall provide with the vehicle a detailed description of the procedure for replacement. ~~This paragraph is not applicable to:~~

(a) ~~Devices approved with a non replaceable light source;~~

(b) ~~Devices approved with light sources according to Regulation No. 99."~~

*Insert new paragraph 5.23.1.*, to read:

"5.23.1. **In the case where a light source module includes a holder for an approved replaceable light source according to Regulation No. 37, this light source shall be replaceable as required above.**"

*Insert new paragraphs 5.29. and 5.29.1.*, to read:

"5.29. **A light source module shall be:**

(a) **only removable from its device with the use of tools and**

(b) **so designed that regardless of the use of tool(s), it is not mechanically interchangeable with any replaceable approved light source.**

5.29.1. **A LED module does not need to be replaceable, if so stated in the communication sheet of the component type approval."**

## II. Justification

1. This proposal amends the definition of "LED Modules" and the associated provisions in Regulation No. 48. A related proposal amending the provisions in Regulation No. 112 is submitted as ECE/TRANS/WP.29/GRE/2011/21. The following justification relates to both of these proposals and explains the reasons for the amendments to the individual paragraphs.

2. Regulation No. 48, paragraphs 2.7.1.1.3., 2.7.1.1.7. and 5.29.; Regulation No. 112, paragraph 5.10.:

(a) Light source modules were introduced into UNECE Regulations as replaceable carriers for non-replaceable light sources. In that respect, allowing a light source module to comprise as well a holder for approved light sources clarifies that this combination is not in contradiction to the definition of a light source module. In paragraph 5.10 of Regulation No. 112, it is clarified that although holders are allowed on LED modules, hybrid solutions are not allowed for the principal low beam, the contribution to the bend light according to paragraph 6.2.9.2. or each of the two allowed high beams.

(b) In order to have a clearer separation between the definition and requirements related to a light source module, the last sentences of the original paragraph have been moved to newly introduced paragraph 5.29. of Regulation No. 48.

3. Regulation No. 48, paragraphs 5.23 and 5.23.1.:

(a) Similar to non-replaceable light sources and light sources according to Regulation No. 99, replacement of light source modules and hence also LED modules should only be done by experts and not by drivers. Unlike most classical replaceable and approved filament light sources, light source modules are not readily available to drivers.

(b) The original text in the paragraph 5.23 could be interpreted in such a way, that the paragraph is not applicable to a complete lamp/device and to all light sources in the lamp even not to the replaceable light sources according to Regulation No. 37 in the case of any one of the exceptions listed under (a), (b) or (c). Therefore, it is proposed to state explicitly that the paragraph applies to all approved replaceable light sources according to Regulation No. 37 irrespective of the presence of other light sources or light source modules.

4. Regulation No. 48, paragraph 5.29.1.; Regulation No. 112 paragraphs 2.2.2. (b), 5.3.2.4. and Annex 1, item 9.:

(a) Experience with first LED headlamps has shown that their design imposes specific challenges.

(b) One new aspect as compared to existing headlamp technology is the need to ensure reliable thermal management. A solution that has been implemented in the market is the permanent gluing of the LEDs to a heat sink. Furthermore, active cooling systems are implemented which are closely attached to the heat sink. Thus, the whole unit creating the low beam is rather big and complex.

(c) Furthermore, optical systems as designed today often use multiple LED light sources contributing to the creation of a beam pattern. The focal length of such optical systems is typically shorter and therefore more sensitive to tolerances of the alignment of the source relative to the optical surfaces. Therefore, specific manufacturing techniques have to be applied to align the beam pattern generated by the various light sources to comply with the legal requirements for the headlamp. Again, this leads to sub-assemblies in the headlamp which are rather big and complex.

(d) If levelling in the headlamp is needed (not always required depending on the suspension system of the car), the integration of the optical unit requires interconnect to the levelling system in a very specific way.

(e) Installing such sub-assemblies is done in dedicated assembly steps, in general using specific assembly equipment and tooling. The special skills to assemble such an optical unit in the headlamp are certainly not present at the car driver, but are also not at garages or car repair shops.

(f) Furthermore, making such large units exchangeable would require large openings in the headlamp housing (e.g. a removable front lens). This increases the risk of

leakage in case of incorrect reassembly or dirt contamination due to the large exposed areas. Both would potentially affect the performance of the lamp in a negative way.

(g) As a conclusion, the exchange of neither the LED nor the beam generating sub-assembly is recommended. It would also not provide an economically attractive solution, since the value of the headlamp is mainly comprised in the sub-assembly. Due to the expected long life time of LED solutions, no regular exchange should be necessary.

(h) The GTB LED Front Lighting Working Group has devoted several sessions to develop a clearer, simpler and widely accepted redefinition of LED modules. It has been concluded that the clearest solution is to give the applicant the freedom to decide whether LED modules shall be replaceable or not. It is proposed that the applicant for the type approval communicates this decision on the communication sheet. This removes also any doubt whether or not the photometry of the lamp needs to be tested after the exchange of a replaceable LED module.

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