
Proposal for amendments to documents GRSG/2023/8 and GRSG-125-15 [Supplement 7 to the Original Version of UN Regulation No. 122 (Heating systems)]

The text reproduced below was prepared by the expert from OICA, Republic of Korea, Netherlands, Germany and France to improve the provisions about compliance demonstration of the radiation warmers. The changes to document GRSG-125-15 are marked in tracked version.

I. Proposal

Insert new paragraph 2.10., to read:

~~"2.10. "Radiation warmer" means a device that is mounted on the surface of the interior of the vehicle and transmits heat to the human body in the way which radiates heat without direct contact with the human body and without an intermediate medium."~~

Paragraph 6.1.1., amend to read:

6.1.1. "Heating system" means any type of device which is designed to increase the temperature of the interior of a vehicle, including any load area **and/or the perceived temperature of occupants.**

Paragraph 6.1.5., amend to read:

"6.1.5. "Electric heater" means a device using electric energy from an on-board or external source to increase the temperature of the interior of the vehicle **and/or the perceived temperature of occupants.** Electrical devices which are installed in addition to the main heating system and whose main function is not to heat the interior of the vehicle are not considered as electric heaters according to this Regulation. For example, electric devices installed in components for the sole purpose of heating that component, ~~or a device that uses radiant heat to warm the human body, such as radiation warmer,~~ are not considered as electric heaters according to this Regulation."

Paragraph 6.2., the specification: General, amend to read:

"6.2. Specifications: General

The requirements for heating systems are that:

- The heated air entering the passenger compartment shall be no more polluted than the air at the point of inlet to the vehicle,
- The driver and passengers, during road use, will not be able to come into contact with part of parts of the vehicle or heated air liable to cause burns, **especially for radiation warmer, it must be turned off immediately if any part of the skin comes into contact with the surface of the radiation warmer,**
- The exhaust emissions from combustion heaters are within acceptable limits.

The test procedures for verification of each of these requirements are set out in Annexes 4, 5 and 6."

Annex 1, Part 2, Appendix 1, Section II amend to read:

...

10. The vehicle is approved according to the requirements of Annex 9 (ADR): Yes/No 2/.

"11. The surface temperature exceeds the limit values mentioned in paragraphs 2.1.to 2.3 of Annex 5: Yes/No"

Annex 5,

Paragraph 2, amend to read:

"2. Surface Temperature

The surface temperature of any part of the heating system likely to come into contact with ~~front any driver~~ **occupant** of the vehicle during normal road use shall be measured with a contact thermometer. No such part or parts shall exceed temperature limits defined in paragraphs below **unless the manufacturer can demonstrate show to the technical service in agreement with the type approval authority during the type approval process that his safety concept covers for higher temperatures without increasing the risk for occupants to get burns compared to the risk caused by the temperatures below. Any such demonstration and documentation shall be appended to the test report.** The possibility to exceed these temperatures, does not apply to vehicles of categories M2 and M3 ~~other than for the driver and for passengers~~ seated in the row adjacent to the driver

- 2.1 The surface temperature of any part of the heating system likely to come into contact with the driver of the vehicle during normal road use is limited to 70°C for uncoated metal or 80°C for others materials.
- 2.2. In the case of vehicles of categories M1 and N, any part of the system likely to come into contact with seated passengers during normal road use of the vehicle, with the exception of the outlet grille, is limited to 110 °C.
- 2.3. In the case of vehicles of categories M2 and M3, any part of the system likely to come into contact with passengers during normal road use of the vehicle is limited to 70 °C for uncoated metal or 80 °C for other materials."

II. Justifications

1. As part of a plan to respond to climate change such as carbon neutrality, the sales of electric vehicles are gradually increasing. However, electric vehicles, unlike internal combustion engine vehicles, have a structural problem that requires separate energy consumption to warm the interior of the vehicle since they have no heating source.
2. Currently, Positive Temperature Coefficient heater (PTC) or heat pump, which converts electric energy into a heat source to warm the air in the vehicle inside are mainly used as heating systems for electric vehicles. As a result, AER reduces sharply.
3. To overcome this problem, some automobile manufacturers and research institutes around the world are actively researching the application of radiant warmer as the way to increase heating energy efficiency, and it is shown that they are already achieving tangible results. To understand the benefit of this device, informal document GRSG-124-05 was introduced at the 124th GRSG session.

4. However, considering the characteristics of the radiant warmer, to achieve the best efficiency, the surface temperature of the device must be raised above a certain level. Therefore, in this way it is not possible to meet the non-metallic material limit temperature mentioned in annex 5 of this UN Regulation.

~~5. — Therefore, the above text proposes to exclude the radiation warmer, which is clearly helpful in increasing AER in an electric vehicle, from the category of the electric heater. Moreover, it introduces new a safety requirement to turn off the radiation warmer immediately if there is contact with the human body.~~

5. Reflecting feedback from the 124th GRSG, the Radiant Warmer tech seminar was organised by the Republic of Korea to give interested GRSG experts the possibility to get knowledge and experience with such new heating concepts. It was recognised by the experts that the maximum surface temperature of radiant warmer could be increased above current thresholds from Regulation 122 without increasing the risk that the occupant gets burned. The underlying parameters (e.g. the heat transmission rate of the surface, material, etc.) cannot be exactly defined in the regulation and it was decided that the vehicle manufacturer - deciding to increase the surface temperature - has to show his safety concept that the risk for the occupant to get burned is not higher in comparison to a metal surface with a temperature of 70°C or a plastic one with 80°C. In conclusion, the modification of Annex 5 was included.

6. The experts also decided to amend the definition of heater systems in 6.1.1. to clarify that radiant warmer is covered by Regulation 122.

7. With the changes described in 5. and 6. above, the changes proposed by the Republic of Korea with GRSG/2023/8 are not anymore needed.

8. Lastly, in addition to continuous efforts to improve the performance of electric vehicles, which are environmentally friendly, it is expected that this UN Regulation can be quickly amended to maximize energy efficiency by applying new technologies such as radiant warmer.

9. OICA is concerned that the text proposed in document GRSG-125-15 may lead to disharmonization, while it indeed gives good latitude to the Type approval Authority to evaluate, according to the undefined criteria, whether the heating system is compliant or not.

10. Industry needs flexibility and design freedom, in spite that objective pass/fail criteria do not really exist for such new technology. The text in red bold characters in Annex 5, paragraph 2.1 (new) is inspired by the wording used in UN R130 (Lane Departure Warning), which faces a similar case i.e. no clear pass/fail criterion. The advantage of such wording is that, while it leaves flexibility to the manufacturer to demonstrate compliance via his own approach, it also gives the Type approval Authorities a way to find back the reasoning that led another Type approval Authority to grant approval to a certain heating system. It is virtuous because, with time, the approval community will build up experience and converge toward harmonization.

11. An inconsistency of heating provisions in the current text of Annex 5 was spotted during the elaboration of this proposal. The threshold for rear passengers should be reviewed and modified in a second step.

12. A restructuration of the text is needed to keep current requirements on applicable temperature on the different seating positions: 70-80° for the driver and 110°C for all passengers. This proposal lets the opportunity to exceed the limit applicable to all seating positions in case of safety concept demonstration done to the type approval authority.

13. Rear passengers of vehicles of categories M2 and M3 (incl. upper deck passengers in case of doubledeck buses) may not have control over the setting of the heating. Therefore, the possibility to extend the temperature above 70 °C or 80 ° C should not apply to any passengers other than the passengers seated adjacent to the driver of these vehicles.