

Trolleybuses: Applicability of UN Regulation No. 100 (Electric Power Train Vehicle) vs. UN Regulation No. 107 Annex 12 (Construction of M2/M3 Vehicles) for Electrical Safety

1. At 110th session of GRSG Belgium proposes to amend UN R107 annex 12 by deleting the requirements for trolleybuses (see GRSG/2016/05) and transfer the requirements into UN R100 (see GRSP/2016/07), which will be on the agenda of upcoming GRSP session in May 2016.
2. Due to the design of a trolleybus and stated in UN Regulation No. 107, trolleybuses are dual-mode vehicles. They can operate either: (a) in trolley mode, when connected to the overhead contact line (OCL), or (b) in bus mode when not connected to the OCL. When not connected to the OCL, they can also be (c) in charging mode, where they are stationary and plugged into the power grid for battery charging.
3. The basic principles of the design of the electric powertrain of the trolleybus and the connection to the OCL is based on international standards developed for trams and trains and is implemented and well accepted in the market worldwide.
4. Due to the fact that the trolleybus is used on public roads the trolleybus has to fulfil the regulations under the umbrella of the UNECE regulatory framework due to the existing national regulations (e.g. European framework directive).
5. Therefore the annex 12 in UN R107 was amended to align the additional safety prescriptions for trolleybuses with the corresponding electrical standards.
6. Nevertheless an increasing uncertainty at technical services and type approval authorities during the certification process can be noticed. This leads e.g. to requests to certify a trolleybus based on UN R100 although vehicles “connected to the grid” are explicitly exempted from the scope. Such requests disregard that a trolleybus can be used in a dual mode and that the technology to ensure a sufficient safety standard is originally based on a tram/train design.
7. Unfortunately the mix of requirements to ensure a sufficient safety level for the electric components based on the kind of operation mode (connected to the overhead contact line or using a battery and/or a diesel engine when not connected to the overhead contact line) would lead to an indefinite situation. This cannot be handled by one design approach. The basic safety principles of a vehicle designed based on UN R100 are completely different from principles which are defined in tram/train standards and national regulations.
8. A similar problem regarding the requirements of electromagnetic compatibility is discussed in the TF EMC under the umbrella of UNECE GRE. It seems necessary to clarify the operating modes of trolleybuses and also, depending on these modes, to indicate which regulations or standards should be used.
9. In addition Mutual Resolution No. 2 (M.R.2) of the 1958 and the 1998 Agreements (WP.29/1121), containing Vehicle Propulsion System Definitions (VPSD), item 44., should be amended in the direction of a clarification.
10. Also, beyond pure “Electric Safety” constraints, OICA has identified that in case of a trolley bus equipped with a battery and/or a diesel engine as an internal mean of propulsion, when operating in bus mode (not connected to OCL), then also other UN Regulations will be concerned. For instance, UN Regulations Nos. 10 (EMC), 51 (Noise), 89 (speed limitation of devices), 49 (Emissions) or R13 (Brakes) could be impacted.
11. These items, namely which UN Regulations (UN R100 vs. UN R107) have to be amended (see flow diagrams on next pages), and also how to handle the other constraints (UN R10 etc.), have driven OICA members to seek advice to WP.29 in order to get guidance on how to proceed further with the treatment of electric safety of trolley buses in the frame of UN Regulations.

Figure 1: Current applicability of UN Regulation No. 107 for Construction to trolleybuses

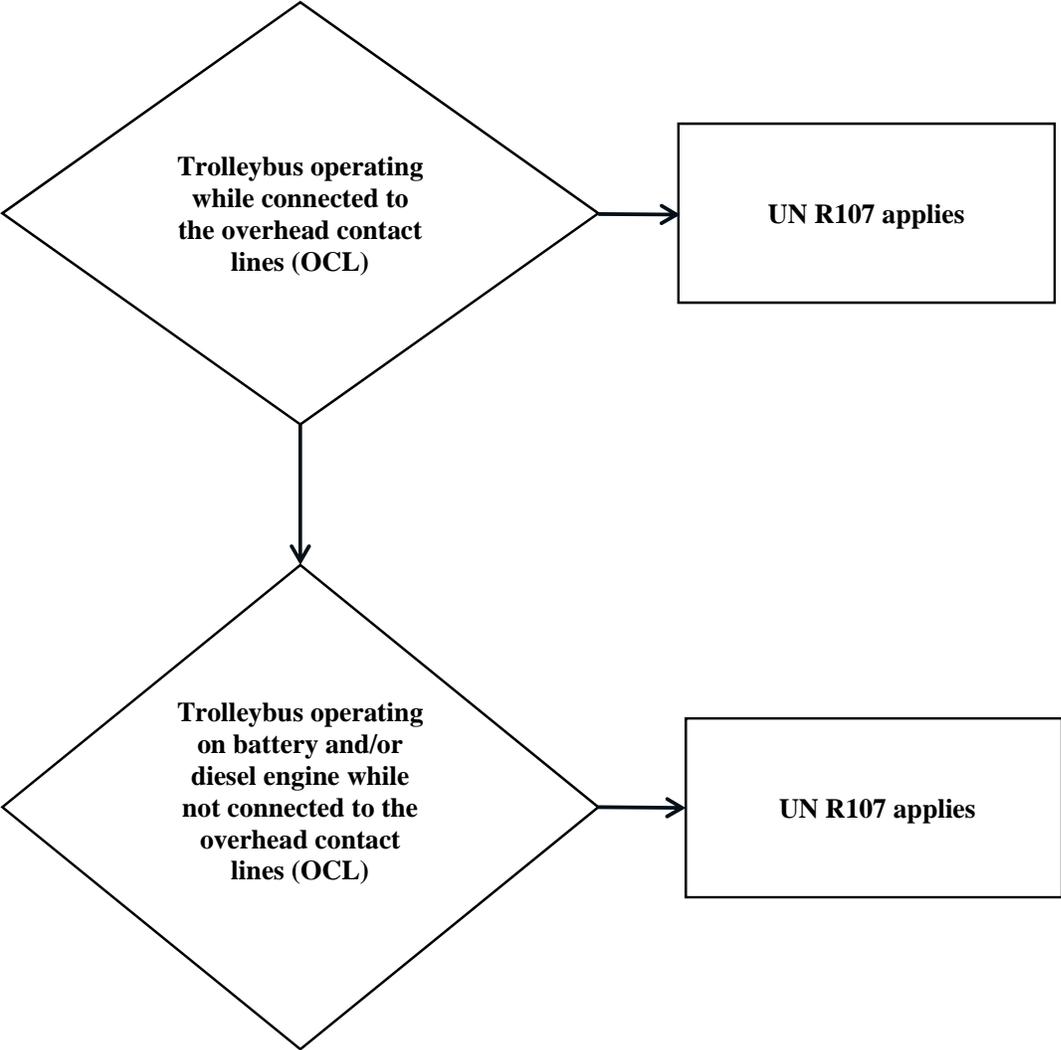
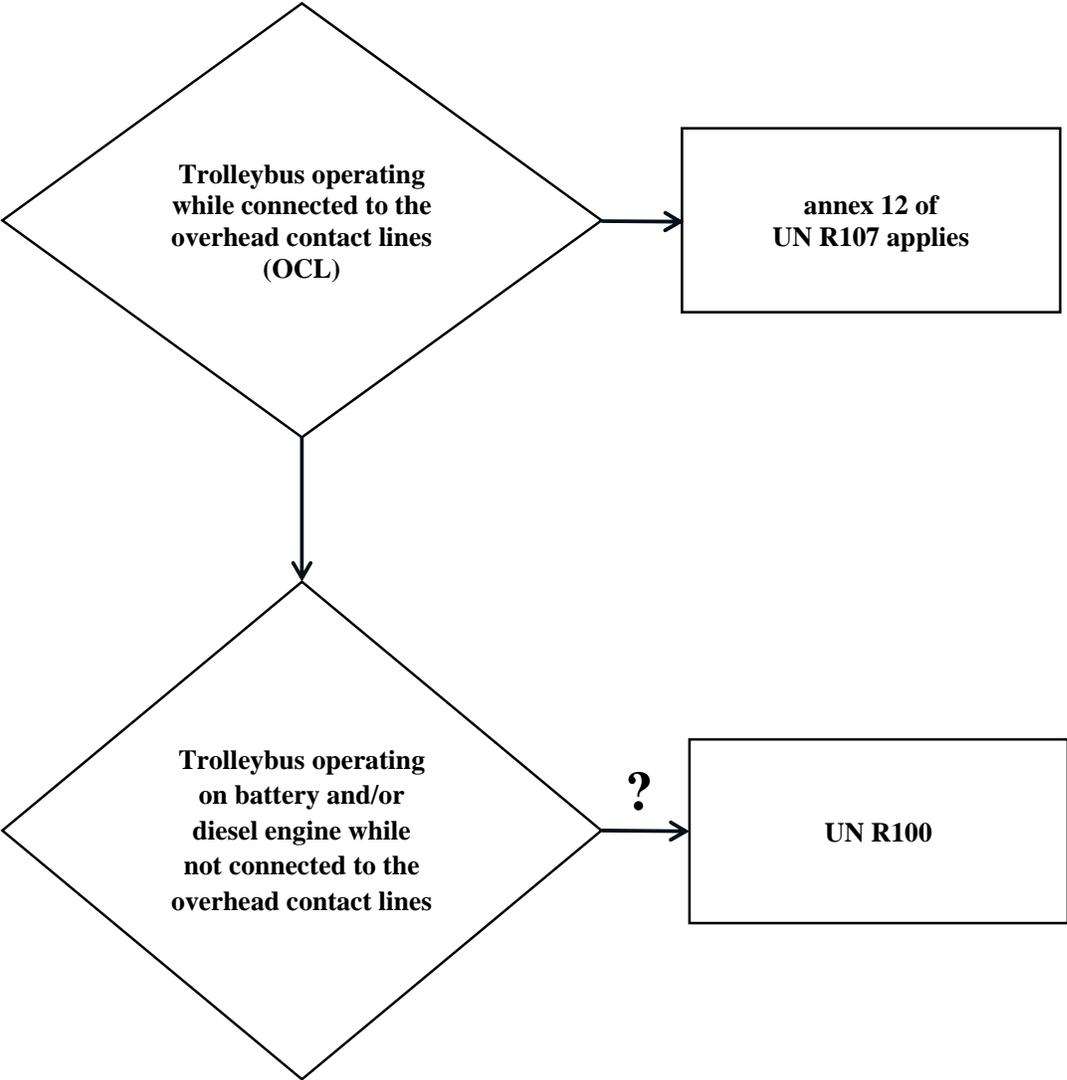


Figure 2: Applicability of UN Regulation No. 100 for Electric Power Trained Vehicle to trolleybuses



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