

## A. Proposal for amendments to UN Regulation No. 107

Annex 12

Paragraph 3.10.12., amend to read:

“... AC value.

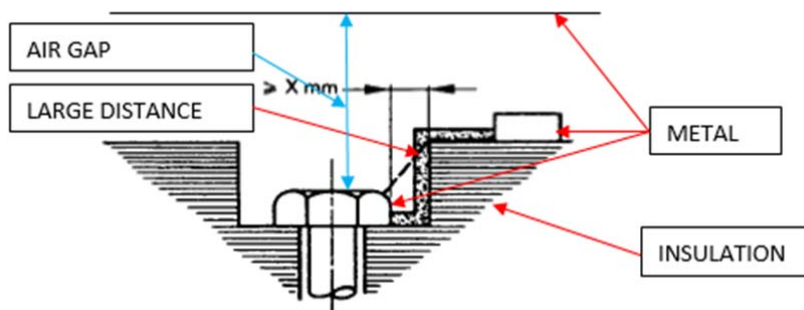
~~Reinforced insulation in trolleybuses is not allowed for circuits directly connected to overhead line~~

**Circuits directly connected to overhead line shall be double insulated.”**

## B. Justification

1) Reinforced insulation is used ordinarily on the many places in the double insulated system, just for example – when inside of the metal box of inverter is a power screw terminal and between screw and metal lid is air gap with large distance – this air gap is Reinforced insulation.

On the Figure is AIR GAP and LARGE DISTANCE the Reinforced insulation.



2) The name “Reinforced insulation” is not written and explained in the point 1.3 of Annex 12. But this is not the main problem.

The best manual how to design correctly the insulation is in the standard EN50124-1. There is explained what is double insulation and what is reinforced insulation include definition, include tables of the clearance and creepage distance, include test procedures. The trolleybuses and trolleybuses with traction batteries or supercapacitors (REESS) has to be designed in accordance with this standard.

**Additional explanatory remark:**

**R100** – is valid for ON BOARD power source (REESS), when the safety during charging of REESS from the external power source is accomplished by the ground connections of the metal sections of vehicle.

**R107 An.12** – is valid for:

- a) the propulsion system (inverter + traction motor) which is supplied directly from external power source, **without** possibility to connect the metal sections of vehicle to ground.
- b) the charging of REESS from external power source, **without** possibility to connect the metal sections of vehicle to ground.

So, deduction is that for vehicle designed and tested in accordance with **R100** is necessary to avoid moving during charging by its own traction motor or by external force.

The connection to the external charging station has to be accomplished by **multi pole power connector, usually 4-pole**.

For the vehicle designed and tested in accordance with **R107 Annex 12**, may be vehicle in moving (is running) during charging of REESS (= connection of the vehicle to the external power source).

The connection to the external charging station could be accomplished by just **2-pole power connector** i.e. current collection system (two poles).

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