TF1 – EC proposal on double insulation based on industry input

EVS12-17

Rationale

The vehicles shall maintain isolation resistance after exposure to water (e.g. washing, flooding). Advanced electrical and vehicle design and technological solutions, such as reinforced insulation or double insulation[[1]](#footnote-1), or any other means of protecting or shielding the voltage equipment and all other devices which might be in a potential contact with a high voltage bus and the electrical chassis, can increase the odds of maintaining isolation resistance after exposure to water.

Moreover, the vehicles equipped with isolation monitoring system can add to the safety of vehicle occupants in case isolation resistance has been compromised, e.g after exposure to water.

5.X.1 Protection against water effects (EVS-08-17e)

If the vehicle is equipped with an isolation resistance monitoring system, the requirements of 5.X.1.1 shall apply. If the vehicle is not equipped with an isolation resistance monitoring system, the tests given in 6.X.1 shall be performed in order that the requirements of 5.X.1.2 are met.

If the vehicle uses reinforced insulation or double insulation, or any other means of protecting or shielding the voltage equipment and all other devices which might be in a potential contact with a high voltage bus and the electrical chassis, the vehicle manufacturer can choose to perform the test according to the requirements given in 6.X.1 or to comply with requirements specified in 5.X.1.3. Testing authority shall confirm the performance of the declared electrical design of the vehicle by performing the High Voltage Withstand Test according to the ISO 6469-3 standard (for the specifics of the test please refer to annex ABC).

5.X.1.1 If an isolation resistance monitoring system is provided, and the isolation resistance less than the requirements given in 5.1.1.2.4 is detected, a warning shall be indicated to the driver. This requirement is additional to a manual of instructions on how to egress the vehicle safely. The function of the on-board isolation resistance monitoring system shall be confirmed as described in 6.1.2.

5.X.1.2 If the test procedures specified in 6.X.1 are performed, just after each exposure, and with the vehicle still wet, the vehicle shall then comply with isolation resistance test given in 6.1.1, and the isolation resistance requirements given in 5.1.1.2.4 shall be met. In addition, after a 24 h pause, the isolation resistance test specified in 6.1.1 shall again be performed, and the isolation resistance requirements given in 5.1.1.2.4 shall be met.

5.X.1.3 Vehicle manufacturers using reinforced insulation or double insulation, or any other means of protecting or shielding the voltage equipment and all other devices which might be in a potential contact with a high voltage bus and the electrical chassis, shall provide evidence/documentation on how the electrical design of the vehicle after water exposure remains safe/maintains isolation resistance. This shall be demonstrated by proving compliance with a component based test as required by IEC 60034/5 (IPX5) standard with respect to water protection of high voltage systems (for the specifics of the test procedure please refer to annex XYZ).

Definitions:

Based on the current definition of a solid insulator in the ECE R100, and in order to avoid any confusion with similar terms in the electrotechnical vocabulary, industry suggests to define a double insulation as following:

“Double insulation” means an insulation consisting of two (2) solid insulators.

"Reinforced insulation" means an insulation which provides the same level of isolation as the double insulation.

The definition of a solid insulator in the ECE R100 is:

"Solid insulator" means the insulating coating of wiring harnesses provided in order to cover and protect the live parts against direct contact from any direction of access; covers for insulating the live parts of connectors, and varnish or paint for the purpose of insulation.

1. Not applicable in case of a combined use of isolated and non-isolated parts within the vehicle [↑](#footnote-ref-1)