# TF3: Electrolyte leakage

EVSTF-04-10e

Final report

## 1] Definitions:

Purpose/justification: The ‘non-aqueous electrolyte REESS’ has some specific concerns which can be different from that of ‘aqueous electrolyte REESS’. In consequence, the validation criteria related to the ‘electrolyte leakage’ should be different. Hence, TF3 proposes to add definitions of the above two types of electrolytes to the GTR. Furthermore, in the present ‘GTR draft’ there is no definition of ‘leakage’ and hence the TF3 proposes a new definition. This definition of leakage is limited to liquid leakage only, as to coherent with the verification methods proposed in the GTR draft.

Proposal: The TF propose to add the following definitions to the GTR

Electrolyte leakage: Visible escape of electrolyte from the REESS in the form of liquid.

Aqueous electrolyte: An aqueous electrolyte is an electrolyte based on water solvent for the compounds (e.g. acids, bases) providing conducting ions after its dissociation.

Non-aqueous electrolyte: A non-aqueous electrolyte is an electrolyte not based on water as the solvent.

Venting: Venting means the release of gases due to excessive internal pressure from cell or battery in a manner intended by design to preclude rupture or explosion

## 2] Leakage detection during ‘in-use test’:

Purpose: The user is supposed to continue to use the vehicle after the in-use event (vibration, thermal shock etc.). The ‘electrolyte leakage’ can be a sign of internal damage. In this case, stringent requirements should be applied, which is ‘no leakage’.

Justification: During the discussion of the TF3, we found that there is no single solution which can fits to all situation and hence it is up to the regulatory agency to define the method, in consultation with the OEM (in case of self-certification).

Proposal: To satisfy the ‘no electrolyte leakage’ criteria of in-use tests, the TF propose the following

“Good engineering judgment should be used to fulfil the requirement of an appropriate coating.”

**Discussion point on 14/09/15: ‘good engineering judgment’ seems unacceptable for self- certification**

## 3] Electrolyte leakage post-crash:

Purpose: The user is supposed to stop using the vehicle until certain repair/maintenance is conducted once subject to the event, presuming the battery would not be re-used for any other purpose than vehicle propulsion. In this case, the requirement relevant to the accident situation, in order to avoid additional risk to the occupants and the surrounding people, should be applied. Here the main concern is the human contact with the corrosive/toxic electrolyte and not the internal damage of the REESS. This is why most of the international regulations allow a certain small amount of leakage (7% or 5 litter)

### 3.1 Measurement of leaked Electrolyte post-crash of ‘aqueous electrolyte’ REESS:

Justification: The main concern for the ‘aqueous electrolyte REESS’ is the potential corrosive nature of the electrolyte and hence during the post-crash situation we should avoid any human contact (occupant as well as the person surrounding the accident site) with the electrolyte. In the present GTR-draft the leakage amount is limited to 7%. JRC has shown that the ‘7% criteria’ is more stringent than the ‘5 litter criteria’. The TF3 found that the measurement techniques provided in the FMVSS 305 is best suited to measure the amount of aqueous electrolyte.

Proposal: To measure the amount of electrolyte, the TF3 propose the following

“The spilled amount of electrolyte can be measured by usual techniques of determination of liquid volumes after collecting the spillage. For containers containing Stoddard, colored coolant and electrolyte, the fluids shall be allowed to separate by specific gravity then measured.”

### 3.2 Electrolyte leakage of ‘non-aqueous electrolyte’ REESS:

Justification: The present requirement in the GTR-draft is as follows: “There shall be no electrolyte leakage from the REESS into the passenger compartment and no more than 7 % by volume of the REESS electrolyte capacity spilled from the REESS to the outside of the passenger compartment.”. The amount of leakage for ‘non-aqueous electrolyte REESS’ is expected to be negligible or zero. This small quantity is not measurable with the existing techniques. As of today, there is no suitable measurement techniques proposed to measure such low amount of liquid leakage. Furthermore this small leakage will not be enough to be in contact with surrounding people. Hence, the TF3 propose that there should not be any visible leakage outside the vehicle. In this way, we avoid any contact with the electrolyte with the people surrounding the crash site. We also propose to keep the no leakage requirement inside the passenger compartment to avoid contact with occupant.

Proposal: To measure the amount of electrolyte, the TF propose the following

“There shall be no liquid electrolyte leakage from the REESS into the passenger compartment and no liquid electrolyte leakage to outside the vehicle. This requirement should be verified by visual inspection. ”

**Discussion point on 14/09/15: agreement on proposed text**

## 4] Potential risk of ‘toxic gases’ from non-aqueous electrolyte:

Justification: During the TF3 discussion, a potential risk related to the ‘toxic gas’ released from ‘non-aqueous’ were discussed. Theoretically this can be possible during in-use test as well as crash test. As of now, there is neither in-field data available on this issue, nor any research data available which can simulate the real life situation. This is why the TF3 propose not to continue the discussion for this GTR-EVS and to postpone the discussion on the issue until relevant data is available.

**Discussion point on 14/09/15: Preamble text proposed by JRC**