UNECE EVS-IWG

OICA response:

CA and CN comments on ”hazardous condition” defintion

27th IWG EVS

Tokyo 27-29 June 2023

OICA

Canadian Opinion

We believe that a more clearly defined definition for hazardous environment/condition is necessary to remove ambiguity from the pass/fail criteria. The OICA proposal is a good starting point for discussion however it could be further refined for more clarity. Should we seek to further define the “realistic exposure conditions”?

Examples

- No explosion
- No visible fire in the cabin nor fire obstructing an exit/emergency exit?
- No concentration of smoke in the cabin above some criteria (first responder sensor)

- OICA agrees and supports proposal to clarify the ”no fire” and ”no smoke” criteria in line with suggestion from CA
- Our understanding is that the realistic exposure time should align with the requirements for TP agreed by the IWG: *egress or 5 minutes prior to the presence of a hazardous situation inside the passenger compartment*
- We support the suggestion to clarify ”no fire” to mean ”fire in the cabin or fire obstructing exit” since this better reflects the actual hazardous condition for the occupants.
- Agreement is needed on how to evaluate hazardous condition in the cabin due to emissions from the REESS
  - Different options should be considered and weighed against each other in terms of practicability, representativeness and robustness
- For EV and REESS where instrumentation for testing is not possible without modifications that may impact the safety performance of the DUT during testing, the ”documentation approach” shall be used

CN comments – FIRE

- **Fire** is easy to judge by observation, but are fires both outside and inside the passenger compartment Hazardous Situation?

➢ We believe that as long as a fire occurs, both inside and outside the passenger compartment, it is a potential danger to passenger. Therefore, it is recommended to visually inspect whether a fire has occurred as a criteria for determining the Hazardous Situation.

- OICA disagrees with the comment from CN that any sign of fire on and around the vehcile represents an equally hazardous condition to the vehicle occupants
- OICA shares the view expressed by CA, that location of fire and how it impacts occupant safety and the possibility to evacuate should be consideredfor the ”no fire” criterion.
- OICA suggests IWG EVS to consider adopting *”No visible fire in the cabin nor fire obstructing an exit/emergency exit”* as proposed by CA, since this represents the conditions that pose immediate risk to occupants while inside vehicle and during evacuation

CN comments – Explosion

- **Explosion** is not easy to determine through observation, so how to determine an explosion? Are both outside and inside the passenger compartment dangerous?

- We believe that as long as a explosion occurs, both inside and outside the passenger compartment, it is a potential danger to passenger.
- For the detection of explosions,
  - The method of UL2580 can be referred to determine whether an explosion has occurred outside the vehicle.
  - and obvious object splashing by visually inspected can be used as a basis for determining whether an explosion has occurred inside the vehicle.

- OICA disagrees with the statement that it is difficult to determine if an explosion has occured or not by observation
- No indication from Technical Services that further clarification is necessary
- ”Explosion” is defined in GTR 20:

3.19. "Explosion" means the sudden release of energy sufficient to cause pressure waves and/or projectiles that may cause structural and/or physical damage to the surrounding of the Tested-Device.

CN comments – Smoke

- **Smoke** is easy to determine by observation, but wether it is Hazardous Situation or not depends on the content and time of both the smoke and gas. How to conduct testing and provide boundaries based on content and time?

- Firstly, we believe that both Somke and Gas need to be tested.
- Since the gas composition in the process of TP is very complex, it is necessary to find representative gases first (Characteristics required： All kinds of batteries will release, high concentrations, easy to test, and have certain hazards). Can CO (carbon monoxide) be used as a representative gas?
- Then, a matrix of concentration and exposure time need to be set up to depict the boundaries of hazards. However, due to the continuous variation of flue gas concentration (considering that the cabin has a certain degree of sealing, the gas concentration generally increases continuously), from the perspective of enforceability, some concentration gradients can be set and the time boundary after exceeding the corresponding concentration can be specified. This provides operability. Due to differences in tolerance among different populations, some compromises in determining conditions should also be acceptable.
- Finally, it is necessary to propose suitable instruments and sensors, etc. for the test, as well as the number and location of sensors arrangements.

CN comments – Smoke (continued)

- OICA agrees that the hazardous condition related to smoke is dependent on the duration of exposure and the quantity of emissions
- Our understanding is that the realistic exposure time should align with the requirements for TP agreed by the IWG: *egress or 5 minutes prior to the presence of a hazardous situation inside the passenger compartment*
- There are different options that need to be considered based on practicability, representativeness and robustness for monitoring emissions, e.g.:
  - ”Hazardous condition” handheld device used by first responders, as indicated by Brian Engle at the TP-TF meeting in June
  - Simulation tools based on gassing kinetics and gas flow models
  - Assessment by ”characteristic gas”, e.g. CO
- Only emissions permeating into the occupant space (vehicle cabin) should be considered for occupant protection
- International standards to evaluate ”hazardous condition” can be used as guidelines and reference
  - ISO 19706:2011 – Guidelines for assessing the fire threat to people

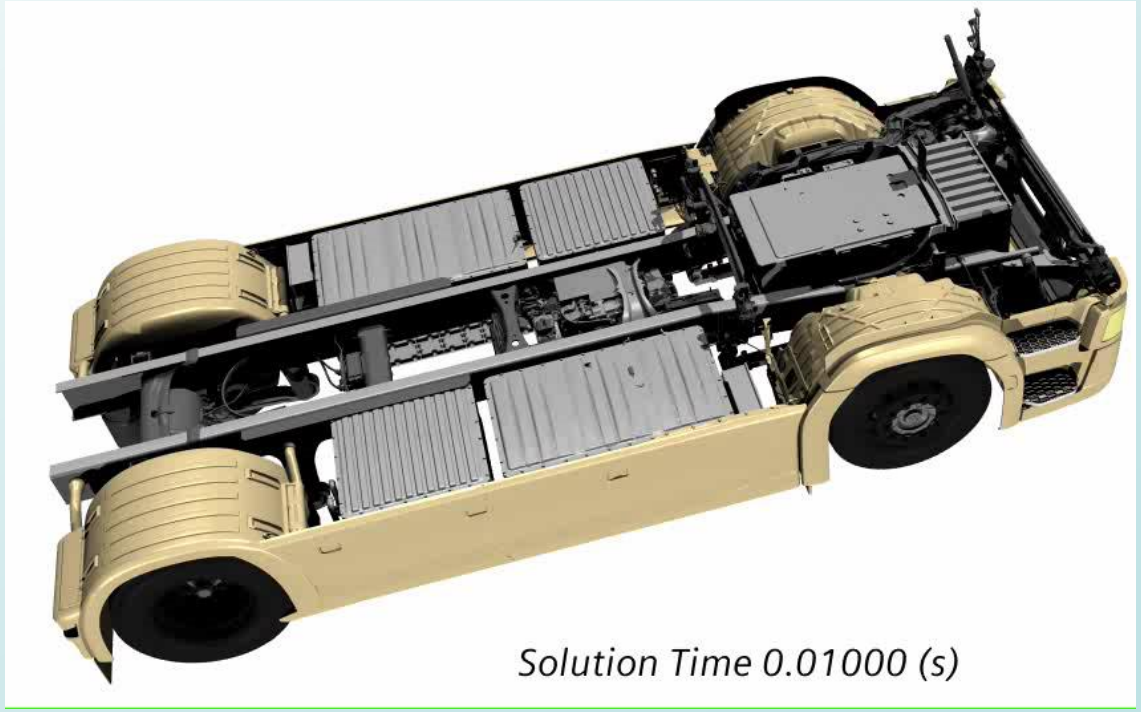
    The purpose of this International Standard is to provide general guidelines for estimating the fire threat to people and to the development of quantitative information on effluent potency for use in fire hazard and risk assessment and for the determination of the toxic potency of the fire effluent from burning products and materials.

Proposal for component level test

- If TP test is performed on vehicle level, evaluation of hazardous conditions from smoke shall be based on emissions inside the occupant cabin during the time for egress or 5 min
- If TP test is perfomed on component level, evaluation of hazardous condition from smoke should reflect conditions inside the vehicle cabin.
- Scaling of concentration of emissions inside the occupant cabin should be performed considering a relevant distance between the REESS and the cabin on the vehicle and the gas tightness of the cabin
  - Utilizing a single cabin tightness factor
  - Simulation of gas emission and flow patterns from the REESS

Example of component level emission evaluation

- Component level TP testing approach is feasible for passenger cars as well as heavy duty vehicles
- The principles of ”family concept” are still applicable
  - Representative ”severe case” for vehicles that are substantially similar with respect to vehicle platform and REESS type
  - Simulations are time consuming, resource demanding and costly to perform



Note: Simulation example is indicative but has been edited for publication purposes.

Acknowledgement: Modelling example provided by courtesy from Scania CV AB