

OICA proposal
Thermal propagation regulatory text
"Documented approach" and "Test
approach"

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OICA understandings:

- “Documentation” approach will remain in parallel to the “test” approach
 - Necessary to future-proof the GTR
 - New cell chemistries
 - New REESS designs
- “No thermal runaway” and “no propagation” will not create “hazardous environment” and therefore such situations will be considered to satisfy the TP requirements
 - Criteria to determine “no thermal runaway” needed
- REESS level test should be allowed to assure the efficiency of the test
 - practical and will be beneficial to accelerate the development.
 - Necessary for HDV
- Tests shall be performed with the system operational since vehicle occupant will typically be present in such mode

OICA supports:

- Boundaries of the requirements; i.e. “protection of vehicle occupants” and “a single cell thermal runaway due to an internal short circuit” are carried over from current GTR20
- Different initiation methods should be allowed, provided sufficient level of thermal runaway of the initiation cell is achieved
 - Determined by criteria of thermal runaway

Clarifications needed

- "Hazardous condition"

A common understanding of what is intended is needed – requires further discussions

[A hazardous situation is a circumstance that exposes the occupants to one or more hazards (for example smoke, fire, explosion) and shall be evaluated based on realistic exposure conditions, considering e.g. exposure time.]

Inspired by ISO 26262

- Warning indication to allow egress or 5 minutes

New text proposed

a) *To allow egress. This requirement is deemed to be satisfied if the vehicle occupants will not be exposed to any hazardous environment caused by thermal propagation (following an accordant performance and documentation of a risk assessment and risk reduction analysis by the vehicle manufacturer in accordance with paragraph 5.4.12.2.)*

or

a) *5 minutes prior to the presence of a hazardous situation inside the passenger compartment. This requirement is deemed to be satisfied if the thermal propagation does not lead to a hazardous situation for the vehicle occupants or if the single cell thermal runaway does not lead to thermal propagation in the REESS.*

Documentation approach

- Content and report structure agreed by subgroup TP-documentation approach
- 4 parts:
 - System analysis
 - Risk identification and mitigation
 - Risk mitigation effectiveness – validation & verification
 - Conclusions

System analysis

- a) A system diagram of all relevant physical systems and components
- b) Description of systems/components relevant to single-cell thermal runaway and thermal propagation due to internal short circuit and their interoperability
- c) Description of advanced warning indication and operating logic
- d) Functional analyses identifying the conditions leading to single cell thermal runaway, i.e. internal short circuit of the cell, and allocating them to the corresponding components or functional units or subsystems

Risk identification and mitigation

- A risk reduction analysis using appropriate industry standard methodology
 - (for guidance, see for example, IEC 61508, MIL-STD 882E, ISO 26262, AIAG DFMEA, fault analysis as in SAE J2929, or similar)
- The risk identification and mitigation analysis shall include:
 - Risk mitigation by design
 - Risk mitigation by manufacturing control
 - Risk mitigation by other means
- Assumptions made about system performance characteristics and properties

Risk mitigation effectiveness

- Tests and verification methods
 - Recognized industry standard tests, for example ISO, IEC, SAE or equivalent
 - In the absence of appropriate industry standard tests, test methods and verification techniques designed by manufacturer
- Data sources and quality requirements
 - Consistency check
 - Completeness check
 - Sensitivity check

Conclusions

- Brief summary of main results
- Statement that the requirements are satisfied, including:
 - The methods used are scientifically and technically valid for the scope of the risk reduction analysis
 - The data used are appropriate and reasonable in relation to the intention of the risk reduction analysis
 - The interpretations are relevant and reflect the assumptions made and the limitations identified for the study
- May be in the form of a critical review report, if available

Test approach – main points

- Category 1-1 and vehicles of Categories 1-2 and 2 with GVM of 4,536 kg or less
 - Vehicle level test or with the complete REESS or with REESS subsystem(s)
- Category 1-2 and Category 2 with GVM exceeding 3,500 kg
 - Complete REESS or with REESS subsystem(s)
- Test method - The test shall be performed using an appropriate industry standard methodology
 - ISO 6469-1:2019/Amd 1:2022 should be used
 - An equivalent industry standard, e.g. UL2580, and SAE J2464, may be used at the choice of the manufacturer
- Detection of thermal runaway updated based on new criteria in ISO 6469-1:2019/Amd 1:2022
- Pre-testing not part of homologation process
- Post-test disassembly analysis not part of homologation process