

GTR#13 TF#4

**Verification Test for Service
Terminating Performance in Fire**

October 2021

Verification Test for Service Terminating Performance in Fire
Objectives

- **Improve reproducibility of the fire test for Compressed Hydrogen Storage Systems (CHSSs).**
- **Expand the test method to include heavy-duty vehicles in addition to light-duty vehicles.**
- **Accommodate various types and sizes of CHSS containers in a performance-based manner.**
 - **Cylinders (regardless of type)**
 - **Conformable containers**

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Status

Changes to the 2-stage localized/engulfing fire test (5.1.4, 6.2.5.1, and rationale) drafted and merged into the GTR#13 Phase 2 draft.

- Includes the burner definition and pre-test checkout to verify set-up prior to the CHSS fire test for range of anticipated CHSS sizes and shapes.
 - Large diameter cylinder for heavy-duty vehicles
 - “Pancaked” conformable containers for light-duty vehicles
- After burner checkout, the CHSS fire test is conducted by simply setting fuel flows (i.e., the specific heat release rates) for the localized fire stage and then the engulfing fire stage.
- TF4 recommends that the localized/engulfing fire test be conducted only with compressed hydrogen.
- The engulfing fire test (6.2.5.2) was deleted as it is no longer needed.

Open Items

- Fire test currently requires vent-down of the CHSS containers (without rupture) before the fire test times out.
 - Time-out occurs after one hour for light-duty and two hours for heavy-duty vehicles.
 - A change is being considered to allow containers to pass without vent-down if additional tests demonstrate sufficient residual stress rupture withstand and post-crash safety.
 - 1) Residual strength for cool-down after fire
 - 2) Ability to perform post-crash vent down of CHSS
 - 3) Ultimate strength and burst tests of CHSS containers

- Round-robin testing to verify the test method is still in progress.

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TEST LABORATORIES PARTICIPATING
IN ROUND-ROBIN

- ✓ JARI (Japan) -- Indoor test
- ✓ Southwest Research Institute (NHTSA US) -- Indoor test
- ✓ TesTnet (Canada) -- Outdoor test of standard and 75mm nozzle spacing
- Powertech (Canada)
- KGS (South Korea)
- BAM (Germany)

NOTES:

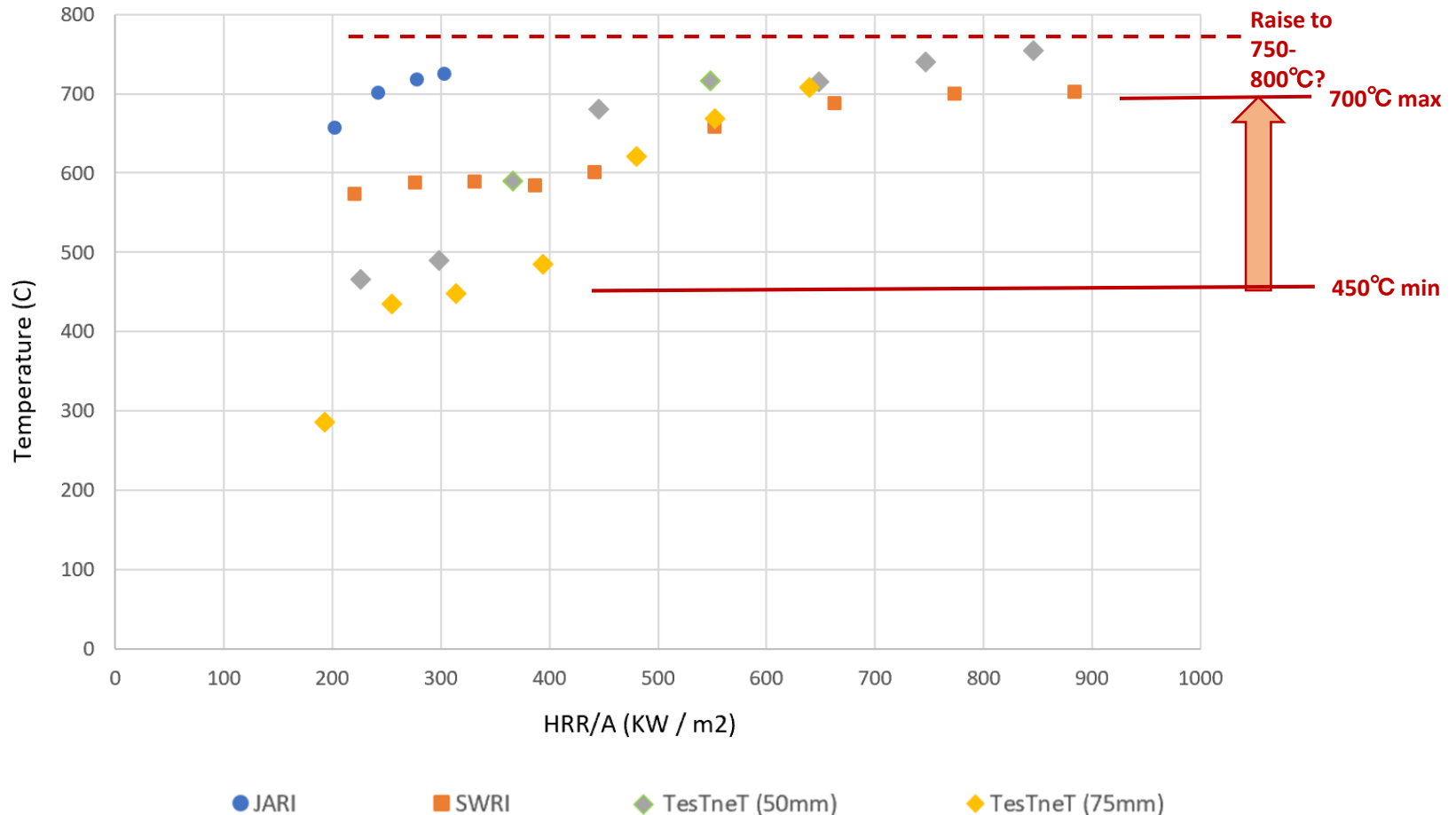
- ✓ *Indicates that round-robin data received*
- *Indicates data not received yet*

Verification Test for Service Terminating Performance in Fire

ROUND-ROBIN TEST RESULTS (TO DATE)

Localized Fire Stage

TEMPERATURE ON BOTTOM OF TEST CONTAINER



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ROUND-ROBIN TEST RESULTS (TO DATE)

Engulfing Fire Stage

AVERAGE TEMPERATURE ON BOTTOM OF TEST CONTAINER

