

GTR#13 TF#4

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

June 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**
 - **Vertical installations of containers**

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Status

- **Changes to the 2-stage localized/engulfing fire test (6.2.5.1) 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.
 - Following 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.
- **Additional changes are currently being considered.**
 - Testing of conformable containers has defined necessary adjustments for containers with large planforms. A proposal for draft changes will be developed.
 - Fire test criteria may be adjusted to require vent down of the CHSS containers before the fire test times out.
 - Changes to the length and width of the burner for larger containers in heavy-duty vehicles are being considered.
 - Discussions have been initiated with regard to the impact of vertical mountings.
- **Six laboratories are participating in the round-robin test plan.**
 - Others welcome!

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Round-robin Test Status

Location	Canada	Canada	Germany	Japan	South Korea	US
Laboratory	Powertech	TesTneT Canada	BAM	JARI	KGS	SWRI
Contact	Matt Dixon	Craig Webster	Karsten Mueller	Y. Tamura		Ian MacIntire
Pre-test Preparations						
➤ Program approval and funding	May 2021		X	X		X
➤ Procure lead-time parts 1) burner nozzles 2) optional heat flux sensors	June/July2021 N/A	June2021 N/A	Aug 2021	X N/A		X N/A
➤ Bench test nozzles	July 2021	June 2021	Sep./Oct. 2021	X		X
➤ Procure other materials	July 2021	June 2021	Aug 2021	X		X
➤ Fabricate the steel test container, localized and engulfing burners, and other test equipment	July/Aug 2021	June 2021	Sept/Oct 2021	X		X
➤ Determine LPG fuel composition and calculate LHV	June 2021	June 2021	Sept 2021	X		May 2021
Perform pre-test checkout burners using steel container per Clauses 6.2.5.1.3 and 6.2.5.1.4.					1) Heat flux measurement to be performed 2) Testing up to 1000 KW/m2	
➤ 1Localized testing	Aug/Sep 2021	July/August 2021	Dec 2021	Complete	Oct/Nov 2021	May/June 2021
➤ Engulfing testing	Aug/Sept 2021	July/August 2021	Dec 2021	Complete	Oct/Nov 2021	May/June 2021
Evaluate alternative burner configurations (optional)	Sept 2021	75mm Nozzle Spacing	N/A	N/A		N/A