

GTR #13 (Phase 2)

FIRE TEST DEFINITION

Task Force #4

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Background

INITIAL LOCALIZED FIRE DEFINITION

Transport Canada and NHTSA conducted research on localized fire testing in response to incidents.

Phase I: Studied current fire safety standards for containers and the characterization of vehicle fires to define a localized fire profile and test procedure.

Phase II: Refined and simplified the test procedures and investigated mitigation technologies.



Source: Powertech Localized Fire Protection Assessment for Vehicle Compressed Hydrogen Containers, 7/23/09



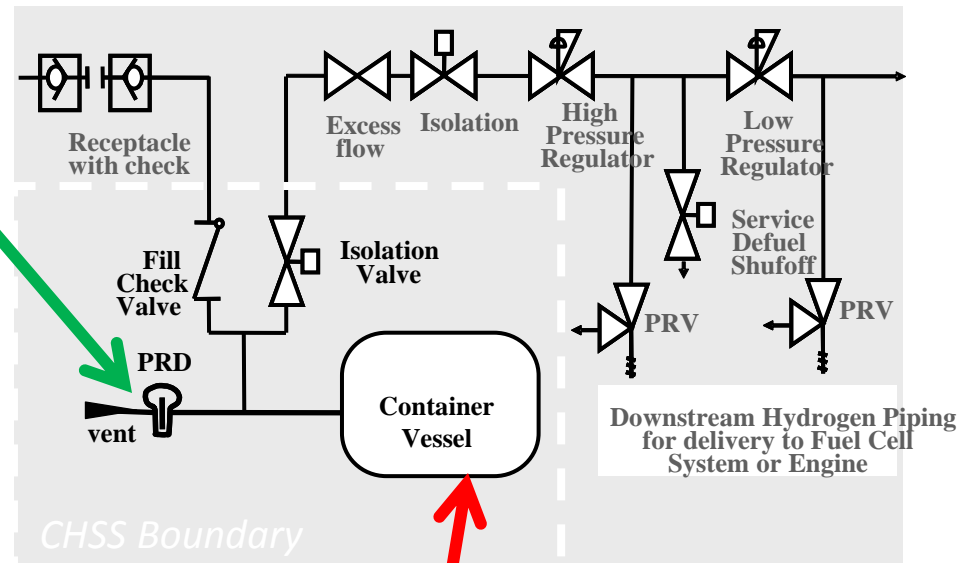
Source: Powertech CNG & Hydrogen Tank Safety, R&D, and Testing, 12/10/09

Background

INITIAL LOCALIZED FIRE DEFINITION

REQUIREMENT

The PRD needs to activate and vent contents during fires before the hydrogen container is weakened and bursts.



CONCERN

Localized fires can weaken the container before PRDs are activated.

Background

FIRE TEST DEFINITION IN SAE J2579

- LPG fuel selected for the test burner
 - Fast response
 - Provides controllability and repeatability

- Two options are provided to the manufacturer for flexibility:
 1. Generic (Non-specific) Vehicle Installation
 - Allows only shields and features that are attached to the vessel or system
 - Size of fire set to 250mm long, covering the full diameter
 - Direction and location of fire set to maximize distance from PRD(s).

 2. Vehicle-specific Installation
 - Allows for thermal shields and features that are part of the vehicle
 - Vehicle features may require reduction in generic fire size.
 - Direction and location of fire based on the vehicle

Background

DEFINITION OF FIRE EXPOSURE IN SAE J2579

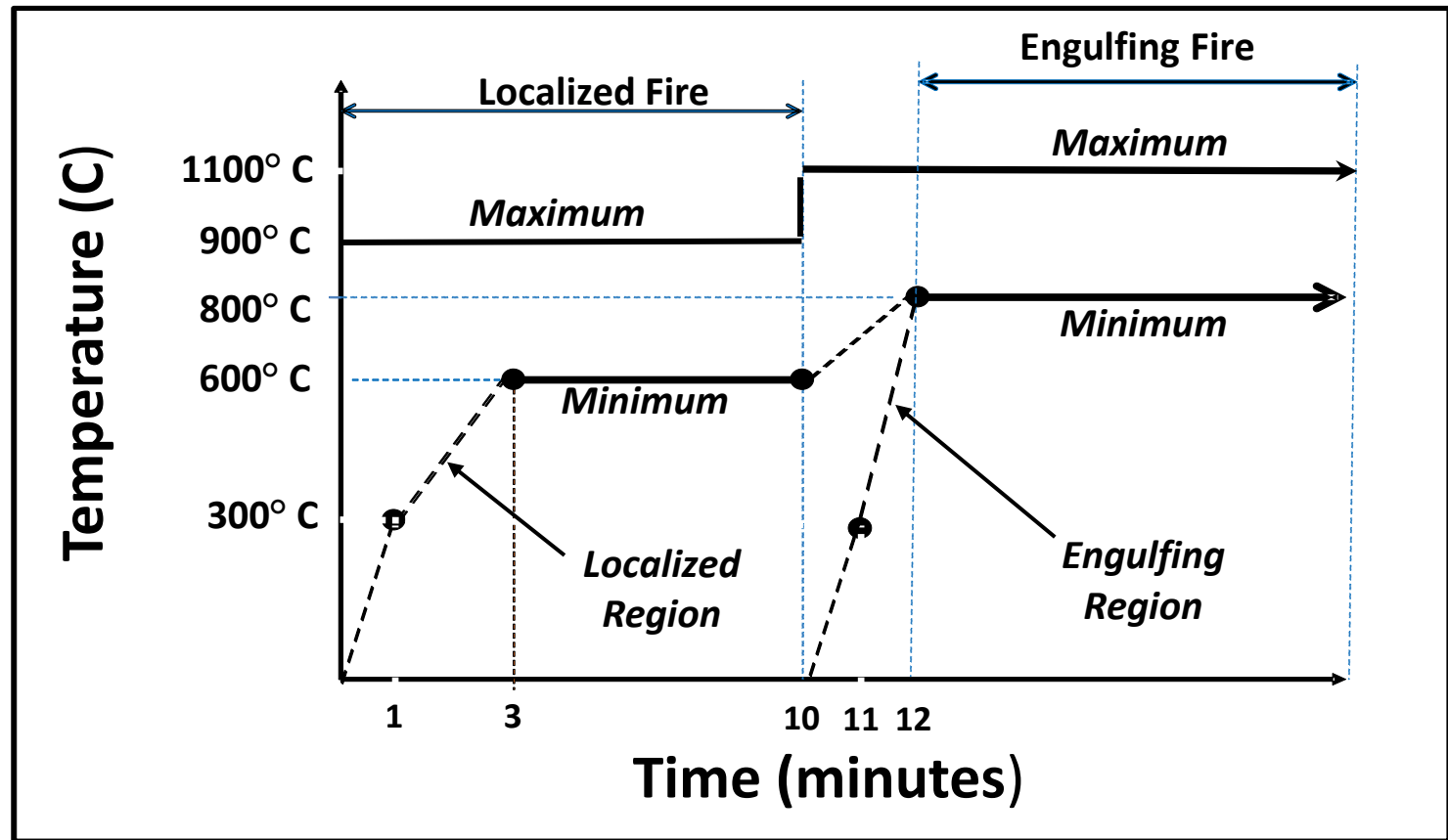
- Vehicle fire tests conducted
 - By JARI and US manufacturers
 - Passenger vehicles, SUVs, and vans tested
- Different fires origins investigated
 - Passenger compartment
 - Trunk
 - Wheel wells
 - Pool fires beneath vehicle
- Representative localized fire test conditions were established based on data provided.
 - Represent worst-case temperature levels and duration of localized fire
 - Transition to engulfing fire after 10 minutes of localized fire

Background

FIRE TESTING IN GTR #13

- SAE J2579 served as basis for fire testing.
- GTR discussions resulted in some changes
 1. Slight modification of the localized fire temperature profile
 2. Decision to extend testing until the T-PRD vents
- SAE J2579 was harmonized with the GTR to avoid confusion.

Background **FIRE EXPOSURE IN GTR #13**



GTR #13 PHASE 2 OBJECTIVES

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- Address variability noted in fire test results at various test sites.
- Expand to Larger Vehicles

SAE SAFETY TASK FORCE ACTIVITIES

- Reviewed and considered situations that produced site-to-site variability in test data. Sources of variability appear to be --
 - Wind effects
 - Variation of the flame height relative to container under test
 - Lack of temperature uniformity within the targeted area of fire exposure
 - Definition of length and width of fire exposure area
- JARI is performing tests to investigate identified sources of variability.
- Data or information needed to expand fire testing to containers in larger vehicles.

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NEEDS

- Address variability in fire test results between various test sites.
 - Additional data and insight into sources of variability
 - Proposals to reduce variability
 - Verification of proposed modifications to the test method
- Expand fire test to larger vehicles
 - Data or information needed to define the test temperature profile.
 - Impact of cargo / load on requirements needs to be accounted for.