Hydrogen and Fuel Cell Technical Advisory Committee
Hydrogen Fueled Vehicle
Global Technical Regulation (GTR)

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Overview

- UN/ECE 1998 Agreement
- Global Technical Regulation (GTR) goals and safety requirements
- GTR Details
- GTR Milestones and Timeline
Harmonization of Vehicle Regulations
1998 Agreement and GTR

Under the framework of the United Nations, the World Forum for Harmonization of Vehicle Regulations (WP.29) is a permanent working party. The U.S., working with Japan and the European Commission, spearheaded efforts to develop the 1998 Global Agreement which allows the Global Technical Regulations (GTR) being developed:

- The industry has become global and needed a predictable global regulatory framework
- Consumers were demanding safety worldwide
- DOT/ NHTSA wanted to establish a formalized instrument for cooperating with other governments on vehicle regulations to learn from their experiences and leverage its limited resources

31 contracting parties are under the 1998 Agreement, including: Canada, China, the EC, India, Japan, Korea and South Africa

NHTSA is currently working under the 1998 Agreement on a global technical regulation (GTR) for Hydrogen fueled vehicles.

This effort is being co-sponsored by Japan, Germany and US; US and Japan chair the meetings
Harmonization of Vehicle Regulations
1998 Agreement

International development of Global Technical Regulations (GTRs) under the 1998 Agreement is guided by three governing principles:

- **Data-driven & science-based**
  - Rigorous research on safety issues and countermeasures enables
    - development of objective compliance tests and methods
    - sound regulatory impact assessments (cost-benefit analyses)

- **Performance-based**
  - GTRs are performance based to the extent possible, which enables and encourages vehicle safety innovations

- **Transparent**
  - Proposed regulations, drafts, and meeting reports are publically available
  - Public comment sought throughout the GTR development process
Hydrogen Fueled Vehicle
GTR Objectives

- Attains equivalent levels of safety as those for conventional gasoline powered vehicles
- Performance based (not design specific)
- Data driven and science-based
- Objectively measurable compliance
GTR Requirements

1. High pressure fuel container system
2. Fuel system at vehicle level: in-use and post-crash hydrogen leakage limits
3. Electrical integrity of high voltage system: in-use and post-crash
   - Type approval components
GTR - Requirements

- High pressure fuel container system
  - Verification Test for Performance Durability: *sequential hydraulic cycling tests*
  - Verification Test for Expected On-Road Performance: *sequential pneumatic/hydraulic cycling tests*
  - Verification Test for Service Terminating Performance: *fire test*

- Fuel system integrity
  - In-use: fuel leakage mitigation
  - post crash: maximum allowable leakage limit

- Electrical Safety
  - High voltage safety for in-use and post crash
Verification Test for Performance Durability
Sequential hydraulic cycling tests

Based on the cycling tests in SAE J2579:
- Proof pressure test
- Drop (impact) test
- Surface damage
- Chemical exposure and ambient temperature pressure cycling tests
- High temperature static pressure test
- Extreme temperature pressure cycling
- Residual proof pressure test
- Residual strength burst test
Verification Test for On-Road Performance
Sequential pneumatic/hydraulic cycling tests

Based on the cycling test in J2579:

- Proof pressure test
- Ambient and extreme temperature gas pressure cycling test (pneumatic)
- Extreme temperature static gas pressure leak/permeation test (pneumatic)
- Residual proof test
- Residual strength burst test (hydraulic)
Fuel system integrity

- In-use: fuel leakage mitigation
  - Fuel system safety requirements
  - Provide warning to the driver and close the fuel containers in the event of fuel leakage into the enclosed spaces

- post crash: Contracting parties maintain their current crash test requirements and apply the following GTR requirements
  - Maximum allowable leakage limit
  - Controlled leakage into enclosed spaces
Electrical Safety

⚠️ High voltage safety for in-use and post crash

- **In-use:**
  - Maximum voltage
  - Electric isolation
  - Protection from indirect and direct contact

- **Post-crash:**
  - Maximum voltage
  - Electric isolation
  - Protection from indirect and direct contact
Milestones and Timeline

- WP.29 approved GTR – 6/2007
- GTR expert group conducted 10 formal meetings
- Formal GTR to GRSP – 5/2011
- Formal GTR to WP.29 for a vote – 11/2011
- Contracting Parties under the 1998 Agreement shall be obligated to start the adoption of the GTR into its own laws or regulations after favorable vote by WP.29
Thank you