



Fuel Cell Standards

XV. On-Board Hydrogen Storage

XV.a Theory and Operation of On-Board Hydrogen Storage Systems

Overview:

Classroom instruction on basic hydrogen storage systems, history, theory, refueling protocols, safety layers and major component identification

- Basic gas laws and calculations
- Hydrogen specific properties
- Hydrogen storage methods and history
- Hydrogen storage schematics
- OEM hydrogen storage system specific service documents
- Overview of basic components and locations
- Review of applicable DOT and FVMSS specifications
- Review shipping requirements for a hydrogen storage system

Description:

Hydrogen Storage Systems are crucial to the cost-effective production of fuel cell vehicles and are the main sub-system responsible for vehicle safety during operation, refueling, crashes and vehicle maintenance. A thorough understanding of the hydrogen storage system operations and its components is required to diagnose, troubleshoot and repair/replace these systems.



Outcome (Goal):

Students will be able to describe hydrogen storage system functions and safety mechanisms. They will be able to identify major subsystem components and perform basic compressed gas calculations.

Objectives:

Student will be able to

1. Be able to identify major hydrogen storage components and location
 2. Use basic gas laws to calculate volumes, pressures and temperatures.
 3. Calculate fueling times
 4. Locate and identify each component of the hydrogen storage system including refueling receptacle
 5. Reference OEM service procedures to find critical information.
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Tasks:

Students will

1. Use a hydrogen storage system or vehicle and OEM service instruction to identify its various components
 2. A vehicle topology diagram or live vehicle determine the location of the hydrogen storage subsystem.
 3. Given a worksheet, the students will calculate the approximate kg capacity of a storage cylinder at pressures of 1, 350, 750 and 875 bar.
 4. Students will calculate the approximate fueling time given a flow rate and tank capacity.
 5. Students will locate and identify each component of the hydrogen storage system including refueling receptacle.
 6. Students will be able to use OEM service information to identify a vehicle's maximum and minimum temperature and pressure for operation, storage and shipping
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