Fuel Cell Standards

XIX Fuel Cell Cooling System

XIX.a Cooling System Theory and Operation

Overview:

Classroom instruction topics

- General cooling system principles
- Review of FCEV versus ICE cooling system components
- Review fuel cell cooling system schematic for major components and individual coolant loops
- Basic calculation of waste heat generated by a fuel cell and paths
- Temperature and coolant level sensors
- Cooling system electrical isolation
- Overview of basic components and locations

Description:

A fuel cell vehicle generates less exhaust system waste heat when compared to than an ICE system, but it requires a much larger cooling systems due to a larger amount of waste heat generated by the entire system. To maintain the isolation of high voltage of the fuel cell from the vehicle chassis and other systems components, requires special a coolant that contains additives that will provide and maintain low conductivity.

Outcome (Goal):

Students will be able to identify major subsystem components, describe fuel cell vehicle cooling system functions and cooling system failure modes.

Objectives:

Student will be able to

1. Identify major cooling system components and locations
2. Calculate waste heat output of a stack given basic data
3. Reference OEM service information to acquire fuel cell cooling system specifications
4. List major fuel cell cooling system failure modes

Tasks:

Students will

1. Identify the major components of the fuel cell cooling system on a live vehicle
2. When provided a graphic/schematic, illustrate the direction of coolant flow through each component of a fuel cell cooling system
3. When provided basic data, calculate waste heat at various electrical power levels
4. Use OEM service information to list the maximum and minimum fuel cell cooling system temperatures during operation, storage and shipping
5. Utilize OEM service information and provide the primary failure modes of the cooling system

To comment or offer suggestions on this standard, contact Ken Mays:

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