
Fuel Cell Standards

XIX Fuel Cell Cooling System

XIX.f Heat Exchangers (HEX) and Fans

Overview:

Classroom and lab topics

- Coolant flow direction through heat exchangers
- Heat exchangers sizing and locations
- Heat exchanger material contribution to ions in coolant
- Fan types and application
- Diagnostic Trouble Codes associated with heat exchangers and fans

Description:

Fuel cell vehicles have high and low temperature loops, higher thermal loads and unique coolant conductivity requirements which may require multiple dedicated heat exchangers and radiators. The heat exchanger/radiator fans are one of the critical components in keeping the stack as close to isothermal as possible during high power operation. Due to low delta T and high waste heat removal through the coolant, FCEV fans are higher powered and have higher and more variable flow rates versus ICE plants of comparable power output.

Outcome (Goal):

Student will be able to test, inspect and replace an OEM heat exchanger assembly and fan assembly using OEM documentation.

Objectives:

Students shall be able to:



1. Diagnose proper heat exchanger operation
 2. Diagnose proper fan operation
 3. Remove and replace the OEM heat exchanger assembly.
 4. Inspect the OEM heat exchanger assembly for leaks and mechanical integrity.
 5. Utilize serial data (scan) tool to determine the operation of the heat exchanger module system.
 6. Utilize OEM service information to acquire heat exchanger module performance metrics.
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Tasks:

Students will

1. Use a schematic, OEM service instructions and an OEM vehicle or complete fuel cell system to identify the heater and associated harnesses
 2. When provided with a vehicle and a serial data (scan) tool, use the vehicle on board diagnostics to confirm coolant heat exchangers and fans for proper operation.
 3. Remove and replace the heat exchanger fan module using OEM service instructions
 4. Visually inspect the heat exchanger fan module on a live vehicle for leaks and mechanical integrity.
 5. Utilize OEM service information to determine if the heat exchanger module is operating within performance metrics.
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