

---

## Vehicle Electrification System Standards

### IX. On-Board High Voltage Battery Charging Systems

---

## IX.b Overview of On-Board High Voltage Battery Charging Systems

### Overview:

#### On-Board High Voltage Battery Charging Systems

- On-Board Charging System Vehicle Architectures
  - kw-h to A-h Conversion
  - On-Board Charger ratings in PHEV and BEV products
  - Battery Pack Charging Time vs. On-Board Charger Rating
  - Air Cooled vs. Liquid Cooled On-Board Chargers
  - Level 1, 2, and 3 Charging Review
    - Level 1 Charging & Battery Pack Charging Control
    - Level 2 Charging & Battery Pack Charging Control
    - Level 3 Charging & Battery Pack Charging Control
- 

### Description:

A PHEV or BEV On-Board battery pack charging system serves to charge the battery pack by using 110/120Vac, 220/240Vac or 480Vdc electrical power from a charging station that is provided by a local utility power source. Whether the On-Board charger services a PHEV or BEV system, the charger, combined with commands from the Battery Pack controller, will determine the charging time and charging rate. This ultimately determines the vehicle all electric driving range.

---



Outcome (Goal):

Students will be able to locate the OBC module, convert kW-h to A-h units, identify what Levels of charging are utilized on any given vehicle type and model, determine the approximate charging time of a battery pack, and analyze the performance of the OBC system using off-board analysis tools.

---

Objective:

Students shall be able to:

1. Visually identify the location of the On-Board charging module
  2. Convert kW-h to A-h and A-h to kW-h for when provided specified PHEV and BEV battery pack systems
  3. Determine the type of charging standard is being utilized on specific vehicle product models
  4. Determine the approximate charging time of specified battery packs when the charging cycles begin at specific State of Charge values
  5. Visually determine the type of OBC cooling system and locate each cooling component.
- 

Task:

1. Given a vehicle topology diagram or live vehicle, the Students will be able to determine the location of the On-Board charging module and the high voltage contactors used for battery charging
  2. Given a worksheet, the Students will calculate and convert three PHEV battery pack kW-h to A-h and three BEV A-h to kW-h
  3. Students will determine the approximate charging time of specified battery packs when the charging cycles begin at 10%, 40%, 70%, and 90% State of Charge, when provided a specific charging rate
  4. When provided a vehicle or vehicle diagram, Students will locate and identify each component of the OBC cooling system
  5. Students will use OEM vehicle service information, component supplier information, and vehicle electrification websites.
- 





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

|                 |  |
|-----------------|--|
| <b>Ken Mays</b> | <b>NEVTEX</b>                                      |
| 541-383-7753    | <a href="mailto:kmays@cocc.edu">kmays@cocc.edu</a> |

