

Training - Battery Validation and Calibration Tests



EBACARA-EN-P



Face-to-face only



5 days

Asynchronous part to be completed
before the face-to-face part

This training course aims to improve skills in battery validation and calibration testing during the design phase

Level

Skilled

Public

Engineers and technicians who wish to design, develop, model, simulate, or use storage systems integrated into electric and hybrid electric vehicles, considering the technical, economic, and industrial constraints of the transportation industry

Objectives

Attendees will be able to implement the following skills:

- Understand and explain the main mechanisms of battery aging
- Understand and be able to explain the integration of aging constraints in battery design,
- Understand and explain battery malfunction and safety tests
- Know the main battery validation and calibration tests,
- Know how to analyze battery performance tests.

Pedagogical & technical resources

Teaching activities, tutorials, and practical work.

Assessment of achievements

- Trainees are assessed throughout the training through practical application phases and interactions with the trainer
- A final on-the-spot evaluation may also be carried out at the end of the course and/or at the end of each module using tests designed to verify the learners' understanding and assimilation of the knowledge linked to the training objectives

Prerequisites

No prerequisites are necessary to follow this course.

Responsible

IFP Training instructors, with expertise in the field and trained in modern teaching methods adapted to the specific needs of learners from the professional world

Program

ASYNCHRONOUS PROGRAM TO BE COMPLETED BEFORE THE SYNCHRONOUS/IN-PERSON COURSE

VIDEOS

Video 1 - Atoms Li-ions.

Video 2 - How batteries work.

Video 3 - Introduction to Lithium.

Video 4 - Composition of Li-ion batteries.

Video 5 - How Li-ion batteries work.

SYNCHRONOUS/IN-PERSON PROGRAM

BATTERY AGING MODELING AND CALIBRATION (LECTURES + PRACTICALS)

2 days

Aging of Li-ion cells.

- Aging mechanisms.
- Description of the main aging phenomena.

Modeling of Li-ion cell aging.

- Approaches.
- Aging models.
- Elements of thermodynamics, electrochemical kinetics, and mass transport.
- Model input parameters.

Tutorial work on battery design models.

- Applications: identifying limiting phenomena, cell design assistance, measurement of physical and geometric parameters.
- Other types of battery models: electrical analogy, simplified models, 3D cell model, resolved 3D microstructural models.

DYSFUNCTIONAL TESTS AND BATTERY SAFETY

1 day

Integration constraints.

Operational safety – safety concept.

Abuse tests.

Thermal propagation:

- Thermal propagation/runaway.
- Vibration.
- Thermal shock and cycling.
- Mechanical shocks.
- Mechanical integrity.
- Fire resistance.
- Protection against external short circuits.
- Overload protection.
- Overheating protection.
- Overcurrent protection.
- Low temperature protection.

Safety/abuse testing: in accordance with recognized standards (transport of hazardous materials – UN, ELLICERT, etc.):

- Mechanical (crushing, penetration, immersion, falling, etc.).
- Electrical (overload, over-discharge, short circuit, etc.).
- Thermal.

PRACTICAL WORK: BASICS OF FUNCTIONAL CHARACTERIZATION TESTS FOR AN IN-VEHICLE APPLICATION

1 day

Electrochemical characterization on educational test benches.

Familiarization with the main characterization and calibration tests required in the Integration Plan Vehicle (IPV), applied to demonstration electrochemical cells.

FUNCTIONAL PERFORMANCE TESTS (LECTURES/PRACTICALS)

0.75 days

Drafting/monitoring of specifications and functional requirements for an automotive embedded application.

Analysis of electrical GMP specifications and drafting of battery specifications for supplier consultation: specifications. Performance - integration specifications - cost specifications, autonomy performance.

Identification of the main functional requirements of the specifications.

Breakdown of battery pack requirements into modules and cells.

Identification of the main functional characteristics required of the cells and the various characterizations and calibrations to be performed. Expected mission profiles.

Drafting of a simplified Vehicle Integration Plan.

Monitoring of IPV requirements. Analysis of various supplier feedback (4 to 6). Summary of results and justification of design choices based on performance, integration, and cost criteria.

EXAM

0.25 day

Verification of acquired knowledge.

Sessions

Rueil-Malmaison - From 03/23/2026 to 03/27/2026

3040 €/HT

To French entities : IFP Training is referenced to DataDock ; you may contact your OPCO about potential funding.

Please contact our disabled persons referent to check the accessibility of this training program : referent.handicap@ifptraining.com