AUTOMOTIVE TECHNICAL ACADEMY (ATA)

ATA-E600

Electric Vehicles (EVs)

Professional Electric Vehicle Systems Engineering & Diagnostics

Curriculum Framework (Version 1.0)

Programme Status: Proposed for Locking

Programme Information

Programme Code:

ATA-E600

Programme Title:

Electric Vehicles (EVs)

Qualification Level:

Professional Diploma – Level 4 (Specialist)

Duration:

48 Weeks

Training Days:

5 Days per Week

Hours Per Day:

8 Hours

Total Contact Hours:

1,920 Hours

Teaching Philosophy

- **70% Practical = 1,344 Hours**
- **30% Theory = 576 Hours**

Entry Requirement

Successful completion of:

- ATA-E100 – General Automotive Electrical

Strongly Recommended:

- ATA-E200 – ECU Repair & Key Programming
- ATA-E300 – Automotive Cooling Systems
- ATA-E500 – Infotainment, Multimedia & Telematics

Programme Goal

To produce professional Electric Vehicle Systems Technicians capable of safely diagnosing, servicing, testing, repairing, calibrating, commissioning, and maintaining battery electric vehicles (BEVs), hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), and emerging electric mobility platforms using OEM procedures, high-voltage safety standards, and professional diagnostic equipment.

Graduate Competency Profile

Graduates shall be able to:

- Apply high-voltage safety procedures.
- Isolate and recommission EV high-voltage systems.
- Diagnose traction battery systems.
- Service battery packs and Battery Management Systems (BMS).
- Diagnose electric drive motors.
- Diagnose inverters and DC-DC converters.
- Service onboard chargers.
- Diagnose charging faults.
- Diagnose regenerative braking systems.
- Diagnose thermal management systems.
- Interpret EV scan tool data.
- Diagnose communication faults across EV control modules.
- Perform insulation resistance testing.
- Perform pre-delivery and post-repair verification.
- Produce professional diagnostic and service reports.
- Follow environmental and battery handling standards.

Programme Structure

Module	Title	Weeks	Hours
E600-01	EV Fundamentals, High-Voltage Safety & Workshop Practice	4	160
E600-02	EV Architecture & High-Voltage Electrical Systems	5	200

E600-03	Traction Batteries & Battery Management Systems (BMS)	7	280
E600-04	Electric Drive Units, Motors & Power Electronics	7	280
E600-05	Charging Systems & Charging Infrastructure	5	200
E600-06	Thermal Management & Energy Management Systems	5	200
E600-07	EV Communication Networks, Diagnostics & Software	5	200
E600-08	Advanced EV Diagnostics & System Integration	4	160
E600-09	Capstone EV Workshop Projects & Quality Assurance	3	120
E600-10	Industrial Attachment, Capstone Assessment & Certification	3	120
TOTAL		**48 Weeks**	**1,920 Hours**

Module 1

EV Fundamentals, High-Voltage Safety & Workshop Practice

Duration: 4 Weeks

Topics

- Evolution of electric mobility
- BEV, HEV, PHEV and FCEV overview
- High-voltage hazards
- Lock-Out/Tag-Out (LOTO)
- PPE for EV servicing
- Rescue procedures
- Safe lifting and vehicle isolation
- Workshop layout
- Environmental management
- Battery incident response
- Professional documentation

Module 2

EV Architecture & High-Voltage Electrical Systems

Duration: 5 Weeks

Topics

- EV architecture
- High-voltage distribution
- Contactors
- Pre-charge circuits
- High-voltage cables
- Orange cable standards
- Fuses and disconnects
- Auxiliary 12V/48V systems
- Isolation monitoring
- High-voltage service disconnects
- System commissioning

Module 3

Traction Batteries & Battery Management Systems (BMS)

Duration: 7 Weeks

Topics

- Lithium-ion battery chemistry
- Battery pack construction
- Cell balancing
- Battery Management Systems
- State of Charge (SOC)
- State of Health (SOH)
- Battery diagnostics
- Thermal runaway awareness
- Battery cooling
- Battery replacement procedures
- Battery recycling fundamentals
- Post-service verification

Module 4

Electric Drive Units, Motors & Power Electronics

Duration: 7 Weeks

Topics

- AC induction motors
- Permanent magnet synchronous motors
- Motor controllers
- Inverters
- DC-DC converters
- IGBTs
- Silicon Carbide (SiC) devices
- Regenerative braking
- Motor cooling
- Drive unit diagnostics
- Power electronics testing

Module 5

Charging Systems & Charging Infrastructure

Duration: 5 Weeks

Topics

- AC charging
- DC fast charging
- On-board chargers
- Charging connectors and standards
- Charging communication
- Charging fault diagnosis
- Home charging
- Commercial charging
- Public charging stations
- Charging safety
- Commissioning and verification

Module 6

Thermal Management & Energy Management Systems

Duration: 5 Weeks

Topics

- Battery thermal management
- Motor cooling
- Inverter cooling
- Heat pumps
- Refrigerant-assisted battery cooling
- Coolant loops
- Energy efficiency
- Range optimization
- Thermal diagnostics
- System performance testing

Module 7

EV Communication Networks, Diagnostics & Software

Duration: 5 Weeks

Topics

- EV control modules
- CAN and CAN FD
- LIN
- Automotive Ethernet (foundation)
- Battery communication
- Drive system communication
- Scan tool diagnostics
- Live data analysis
- Software updates
- Calibration verification
- Functional testing

Module 8

Advanced EV Diagnostics & System Integration

Duration: 4 Weeks

Topics

- System-level diagnostics
- High-voltage fault isolation
- Driveability analysis

- Insulation resistance testing
- Oscilloscope applications
- Integrated system verification
- Performance validation
- Structured diagnostic workflow

Module 9

Capstone EV Workshop Projects & Quality Assurance

Duration: 3 Weeks

Students complete integrated workshop projects including:

- High-voltage system isolation and recommissioning
- Traction battery diagnostics
- Motor and inverter diagnostics
- Charging system commissioning
- Thermal management performance testing
- Complete EV health assessment
- Customer reporting
- Quality assurance documentation

Module 10

Industrial Attachment, Capstone Assessment & Certification

Duration: 3 Weeks

Students complete:

- Supervised industry attachment
- Comprehensive EV diagnostic project
- High-voltage practical assessment
- Technical presentation
- Portfolio defence
- Final written examination
- Practical trade test
- Exit competency assessment

Specialist Laboratories

ATA-E600 requires dedicated laboratories:

1. High-Voltage Safety Laboratory
2. EV Powertrain Laboratory
3. Battery & BMS Laboratory
4. Electric Motor & Inverter Laboratory
5. Charging Systems Laboratory
6. Thermal Management Laboratory
7. EV Diagnostics & Communication Laboratory
8. Battery Inspection & Quality Assurance Laboratory

Essential Training Equipment

Students train with:

- High-voltage PPE kits
- CAT III/CAT IV insulated test instruments
- EV-compatible digital multimeters
- Insulation resistance testers
- EV diagnostic scan tools
- Oscilloscopes
- Battery pack training rigs
- Battery Management System demonstrators
- Electric motor and inverter trainers
- Charging station demonstrators (AC and DC)
- High-voltage isolation verification tools
- Thermal imaging cameras
- Battery lifting equipment
- Cooling system service equipment

Assessment Structure

Assessment	Weight
Continuous Practical Assessment	35%
Practical High-Voltage Trade Tests	30%
Written Examinations	15%
Capstone EV Project	15%

Assessment	Weight
Professional Conduct & Portfolio	5%
TOTAL	**100%**

Career Pathways

Graduates of **ATA-E600** are prepared for roles including:

- Electric Vehicle Service Technician
- High-Voltage Systems Technician
- EV Diagnostic Specialist
- Battery Systems Technician
- Charging Infrastructure Technician
- EV Fleet Maintenance Specialist
- EV Technical Trainer
- EV Workshop Supervisor
- EV Service Centre Manager
- EV Technical Consultant