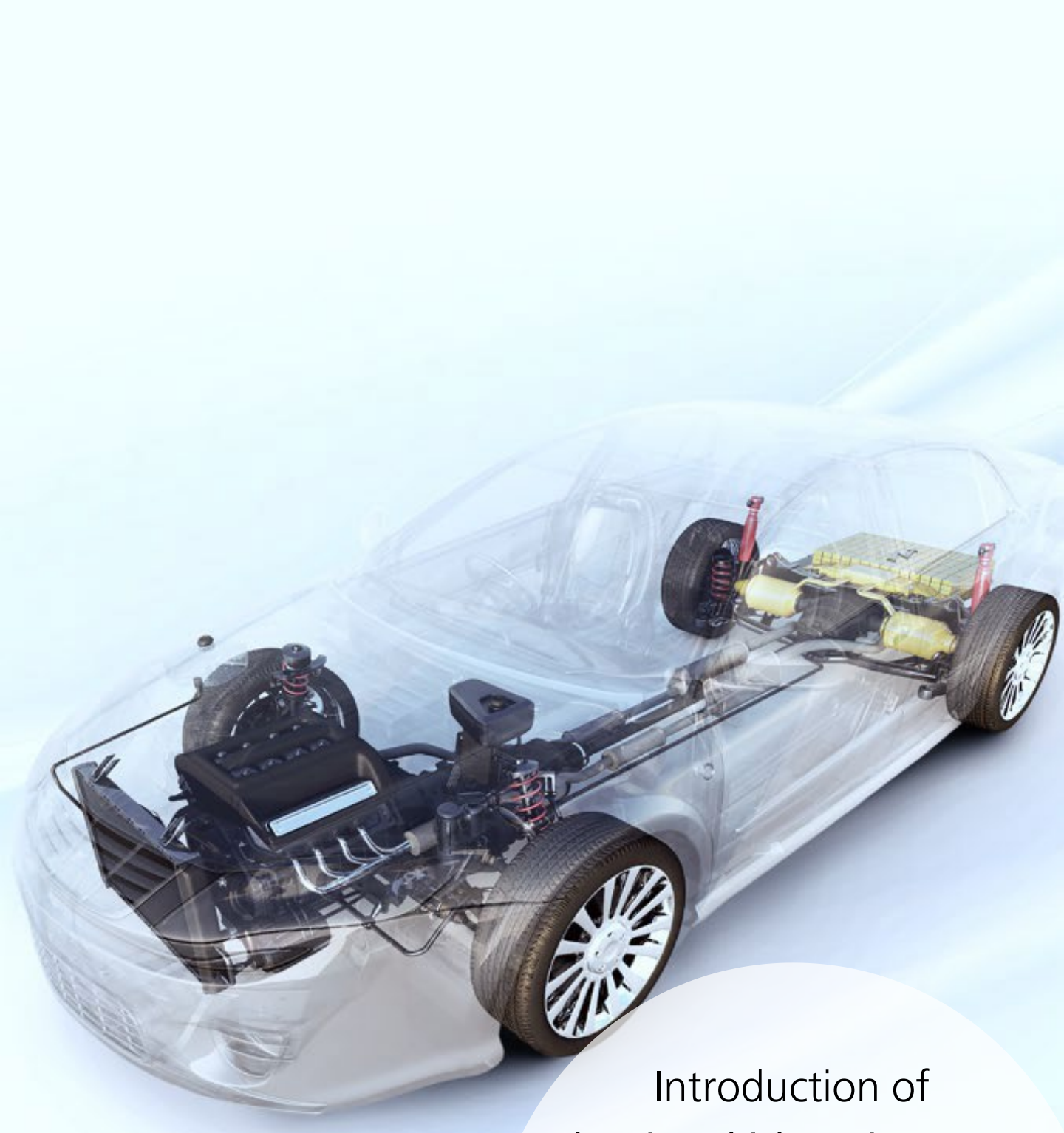


Introduction of
Electric Vehicle Maintenance Service Scope

機電工程署
EMSD

Background

EVs have great risk of giving an electric shock if not operated or maintained properly compared with conventional internal combustion engine vehicles, which may lead to serious injuries or even death. To keep abreast of the latest EV technology and to reduce the risk of electric shock during the maintenance of EVs, the VMTAC has proposed amending the existing "Voluntary Registration Scheme for Vehicle Maintenance" for the inclusion of maintenance service scope, training and workshop requirements related with EV. The "Practice Guidelines for Electric Vehicle Maintenance" is also established for practitioners to follow and to ensure EVs can be maintained in a safe and effective manner.

1. Addition of EV Service Scope

In view of the existing Voluntary Registration Scheme for Vehicle Maintenance is only applicable for internal combustion engine vehicle maintenance, the VMTAC has suggested to add three Service Scope specifically for the maintenance of EV. All existing RVMs will retain their Registered Service Class for internal combustion engine vehicle maintenance.

The service scope and the abbreviation on vehicle maintenance are as follows:

- Internal Combustion Engine Vehicle (Code: IC).
- Electric Vehicle (Elementary) (Code: EVE).
- Electric Vehicle (Low Voltage) (Code: EVL).
- Electric Vehicle (High Voltage) (Code: EVH).

The definition of low voltage system and high voltage system for EVs are defined as follows, which are referenced from different international standards:

	Direct Current	Alternating Current
Low Voltage System	Not Exceeding 60V	Not exceeding 30V root mean square
High Voltage System	Exceeding 60V but not exceeding 1,500V	Exceeding 30V but not exceeding 1,000V root mean square

Existing RVMs can follow the below table for applying to include the respective Service Scope for EVs on top of their existing Registered Service Class for internal combustion engine vehicles:

Registered Service Class	Applicable EV Service Scope
Mechanical (M)	Electric Vehicle (Elementary)(EVE) or Electric Vehicle (Low Voltage) (EVL) or Electric Vehicle (High Voltage)(EVH)
Electrical (E)	Electric Vehicle (Elementary)(EVE) or Electric Vehicle (Low Voltage) (EVL) or Electric Vehicle (High Voltage)(EVH)
Body repair (B1)	Electric Vehicle (Elementary)(EVE) or Electric Vehicle (Low Voltage) (EVL) or Electric Vehicle (High Voltage)(EVH)
Body painting (B2)	Electric Vehicle (Elementary)(EVE) or Electric Vehicle (Low Voltage) (EVL) or Electric Vehicle (High Voltage)(EVH)
Motorcycle maintenance (S1)	Electric Vehicle (Elementary)(EVE) or Electric Vehicle (Low Voltage) (EVL) or Electric Vehicle (High Voltage)(EVH)
Tyre work (S2)	Electric Vehicle (Elementary)(EVE)
Battery work (S3)	Electric Vehicle (Elementary)(EVE)
Lubrication work (S4)	Electric Vehicle (Elementary)(EVE)
Car accessories work (S5)	Electric Vehicle (Elementary)(EVE)
Air conditioning work (S6)	Electric Vehicle (Elementary)(EVE)
Body building work (S7)	Electric Vehicle (Elementary)(EVE)

2. Allowed Works under Different EV Service Scope

A. Service Scope for Electric Vehicle (Elementary) (EVE)

- Allowed to perform relevant EV maintenance work within their registered service category.
- If the maintenance work requires "power-off" or "power-on" procedures, it must be carried out by registered mechanics who possess the EVL RVMs or EVH RVMs.

Note: RVMs within the scope of EVE maintenance services are not allowed to:

- Isolate the HV vehicle traction battery system ("power off"); and
- Restore the HV vehicle traction battery system ("power on"); and
- Diagnose, test, repair, dismantle, replace, or install components of the EV HV system or its interconnected components.

B. Service Scope for Electric Vehicle (Low Voltage) (EVL)

Allowed to perform relevant EV maintenance work within their registered service category while wearing appropriate PPE. This includes:

- Operating specific maintenance plugs or devices to isolate the HV vehicle traction battery system ("power-off").
- Operating specific maintenance plugs or devices to restore the HV vehicle traction battery system ("power-on").
- Diagnosing, testing, maintaining, disassembling, replacing, and installing EV low-voltage systems or components.
- In the case of effectively isolating the HV vehicle traction battery system, using a "one-to-one" method to dismantle, replace, and install the EV HV system or its associated components, but not for diagnosing, testing, or maintaining related components, except for obtaining diagnostic trouble codes (DTCs) using on-board diagnostics (OBD) systems.

Note: RVMs within the scope of EVL maintenance services are not allowed to:

- Diagnose, test, or repair the HV system or its interconnected components of the EV in a situation where effective isolation of the HV vehicle traction battery system is not possible ("live condition"); and
- Diagnose, test, repair, dismantle, replace, or install the entire fixed-position vehicle traction battery and its interconnected HV wires.

2. Allowed Works under Different EV Service Scope (con't)

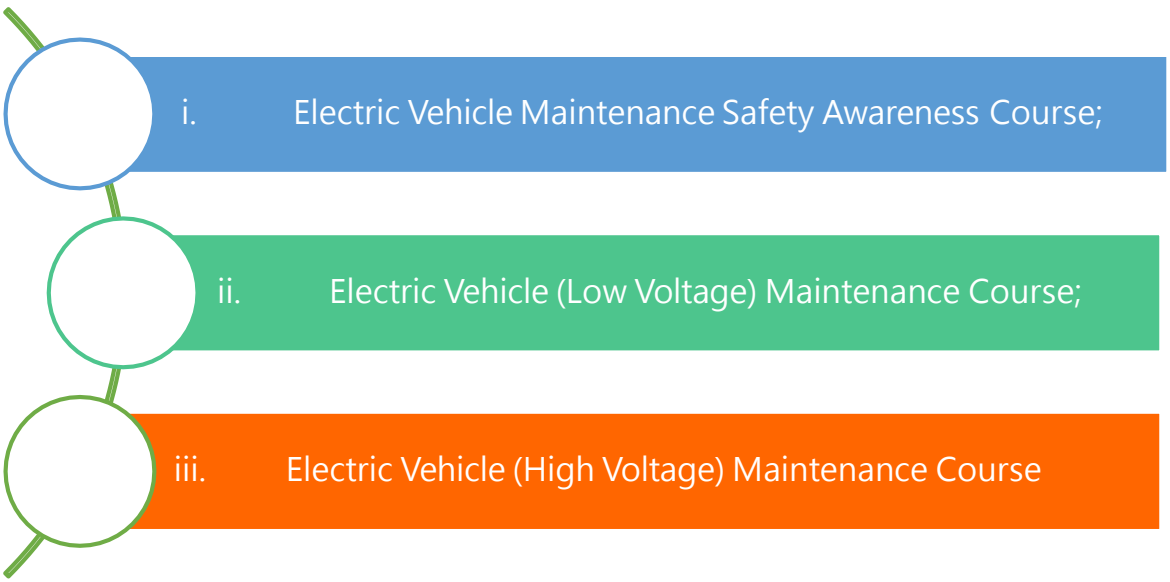
C. Service Scope for Electric Vehicle (High Voltage) (EVH)

Allowed to perform relevant EV maintenance work within their registered service category while wearing appropriate personal safety protective equipment. This includes:

- Isolating the HV vehicle traction battery system ("power-off").
- Restoring the HV vehicle traction battery system ("power-on").
- Diagnosing, testing, maintaining, disassembling, replacing, and installing EV HV systems or their associated components when it is not possible to effectively isolate the HV vehicle traction battery system ("live work"),
- Using a "one-to-one" method to dismantle, replace, and install the entire fixed traction batteries (excluding internal disassembly and maintenance)
- Performing work within the scope of EVL RVMs maintenance services.

3. Electric Vehicle Maintenance Training

The proposed EV training programs will be conducted by appropriate training institutes or organizations and the design of training programs shall be endorsed by the VMTAC. Since vehicle maintenance works under different Registered Service Class will involve different low voltage and high voltage systems and in order to cater the three new proposed Service Scope for EVs, the VMTAC has proposed three corresponding levels of EV training programs, which have specific requirements on competency, minimum training time, training equipment, etc. in order to ensure practitioners, in particular for vehicle mechanics, to be equipped with the necessary knowledge and skills to become a RVM with EV service scope to carry out the maintenance work in a safe and effective manner. The three levels of EV training programs are listed below, from basic to advance level:



i. Electric Vehicle Maintenance Safety Awareness Course

This training program is suitable for all practitioners having work related with EV. RVMs may apply for inclusion of EVE Service Scope to provide Specific (S) services for EVs after completion of the captioned training program.

3. Electric Vehicle Maintenance Training (con't)

ii. Electric Vehicle (Low Voltage) Maintenance Course

This training program is suitable for RVMs with Registered Service Class of either Mechanical (M), Electrical (E), Body repair (B1), Body painting (B2) or Motorcycle maintenance (S1), which allows them to carry out the respective services for EVs under the requirements of EVL Service Scope.

iii. Electric Vehicle (High Voltage) Maintenance Course

This training program is suitable for

(i) Person who have completed Electric Vehicle (Low Voltage) Maintenance Course or

(ii) RVMs who have attained Service Scope for EVL,

which allows them to carry out the respective services for EVs under the requirements of EVH Service Scope.

4. Registration and Renewal for RVM with inclusion of EV Service Scope

Existing RVMs can apply for inclusion of the applicable EV Service Scope to their Registered Service Class after completing the corresponding VMTAC endorsed Electric Vehicle Maintenance Safety Awareness Course, Electric Vehicle (Low Voltage) Maintenance Course or Electric Vehicle (High Voltage) Maintenance Course for performing vehicle maintenance works for EVs.

In addition, Registered Manufacturers or Manufacturers' Local Authorized Representative can recommend current RVMs who are capable of performing low voltage or high voltage works for EVs to apply for inclusion of the appropriate EV Service Scope to their Registered Service Class. Applicants shall need to provide manufacturers' certificate and training records in order to demonstrate that the applicant has achieved all the training criteria endorsed by the VMTAC, and the application shall be submitted to VMRU of EMSD for further processing and approval.

RVMs applying for the inclusion of EV Service Scope will not affect the validity period of the existing registration (i.e. the validity period of a newly issued RVM registration card after addition of EV Service Scope will remain the same). The registration and renewal requirements for existing Registered Service Class for IC shall remain the same but RVMs with EV Service Scope should take EV safety related trainings for continuous professional development and registration renewal purposes.

5. RVMWs with EV Service Scope

A. RVMW with EVE and EVL Service Scope

The vehicle trade generally believes that it is acceptable to provide maintenance works for Specific (S) services or low voltage systems of an EV in various types of RVMWs as long as the concerned RVMW has employed RVM(s) that are registered with the corresponding EVE or EVL Service Scope. The aforesaid view was further confirmed in the first round of trade consultation, and it was unanimously agreed that the relevant EV maintenance works can be carried out in existing vehicle maintenance workshops and there is no need to further establish registration requirements for vehicle maintenance workshops to carry out works for Specific (S) services or low voltage systems of EVs.

On the other side, the works involved in the EVH Service Scope is relatively high in safety risk and the works must be carried out by RVMs registered with EVH Service Scope. Moreover, the maintenance of such works shall only be carried out in RVMWs also registered with EVH Service Scope.

B. RVMW with EVH Service Scope

RVMWs registered with EVH Service Scope with must employ at least one RVM registered with EVH Service Scope, who should be present during business hours. The person in charge of the RVMW registered with EVH Service Scope should provide regular electrical safety training, for example the VMTAC approved EV Maintenance Safety Awareness Course, to all personnel who will come into close proximity with EVs, including but not limited to vehicle mechanics, apprentices, cleaners, etc.

B. RVMW with EVH Service Scope (con't)

If live-line work on EVs is inevitable, the working area of the concerned EV should be segregated into a "caution zone" and must be clearly identified with warning signs. Traffic cones, tape, barriers should be used where necessary for physical separation with other areas and it is also necessary to ensure sufficient space is reserved for rescue support in case of emergency.

When a RVM registered with EVH Service Scope performs live-line maintenance work on the high voltage system of an EV, another person with "rescue support capabilities" must be on standby to provide rescue at any time. The person providing rescue support needs to stay outside the "caution zone" and shall only enter the "caution zone" when necessary. The person providing rescue support shall also prevent other people other than the RVM carrying live-line maintenance works from entering the "caution zone".

In addition to meeting personnel requirements, RVMWs registered with EVH Service Scope must also provide personal protective equipment (PPE), first aid equipment (first aid kit, insulated rescue hook, automatic external defibrillator (AED)), firefighting equipment (fire hydrant / hose reel systems, fire extinguishers, fire-extinguishing blankets, appropriate site facilities (maintenance bays, caution isolation areas, rescue passages), emergency procedures (training procedures), handling and fire-extinguishing procedures for damaged high voltage batteries, etc. RVMWs registered with EVH Service Scope shall also commit that the Guideline on EV maintenance will be followed.

Only Type 1, Type 2, or Type 3 RVMWs can apply to become a RVMW registered with EVH Service Scope, which shall meet the requirements set out by the VMTAC for ensuring that the concerned RVMW is capable to perform high voltage system maintenance works for EVs. At the same time, the application for the concerned RVMW can only be deemed qualified after undergoing an on-site inspection carried out by a vehicle manufacturer or a qualified third-party certification agency followed by submission of report to demonstrate its capability.