



GUIDE ON ELECTRIC VEHICLE CHARGING SYSTEM (EVCS)

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1. OBJECTIVES

1.1. This Guide is developed by the Commission for the following objectives:

- (a) to serve as a concise guide to all competent persons, electrical contractors and consulting engineers who are involved in the electrical wiring work of the EVCS and its supporting infrastructure to ensure it is constructed and operated safely;
- (b) to ensure that the EVCS comply with all the requirements under the Act, Regulations and relevant Standards; and
- (c) to prescribe minimum standards and specifications in the design, installation, inspection, testing, supervision, operation and maintenance.

2. SCOPE

2.1. This guide shall apply to any person who provides or utilizes any EVCS in Peninsular Malaysia, Sabah and Federal Territory of Labuan.

2.2. This guide shall be applicable to all EVCS which includes installation, operation, maintenance, safety, power quality and licensing.

2.3. This guide is not intended in any way to circumvent the application of and obligations or requirements under any other written law or standards. Parties relying on this guide are advised to obtain independent advice on the applicability of the same to their equipment/installations.

3. DEFINITIONS AND INTERPRETATION

3.1. In this guide, the following terms shall bear the following meanings:

GUIDE ON ELECTRIC VEHICLE CHARGING SYSTEM (EVCS)

“Act”	means the Electricity Supply Act 1990 [Act 447] as amended, modified or supplemented from time to time;
“Commission”	means Suruhanjaya Tenaga;
“Energy Supply Laws”	Has the same meaning assigned to it in the Energy Commission Act 2001 [Act 610];
“Regulations”	means the Electricity Regulations 1994, as amended, modified or supplemented from time to time;
“Electric Vehicle (EV)”	means any vehicle propelled by an electric motor drawing current from a rechargeable energy storage system, intended primarily for use on public streets, roads or highways;;
“Electric Vehicle Charging System (EVCS)”	Means complete system including the EV supply equipment and the EV functions that are required to supply electric energy to an EV for the purpose of charging;
“Electric Vehicle Supply Equipment (EVSE)”	Means equipment or a combination of equipment, providing dedicated functions to supply electric energy from a fixed electrical installation or supply network to an EV for the purpose of charging;
“On-board Charger”	All equipment in the charge power supply chain inside the vehicle;
“Off-board Charger”	All equipment in the charge power supply chain outside the vehicle ;
“Facilities”	Any and all real property (including all buildings, fixtures or other improvements located thereon)

	now, hereafter or heretofore owned, leased, operated or used by Company or any of its Subsidiaries or any of their respective predecessors or Affiliates;
“Single Detached Dwellings”	any detached building consisting of one dwelling unit that is occupied or intended to be occupied as the home or residence of one family, such as bungalows, or others that is equivalent;
“Multi-Family Dwellings”	any residential property that contains more than one housing unit, such as a duplex, a townhome, apartment, condominium or others that is equivalent;

3.2. Subject to paragraph 3.1 and unless expressly indicated to the contrary or unless the context otherwise requires, terms adopted and used in this Guide shall bear the same meaning as they are defined in the Energy Supply Laws.

3.3. If there are any conflict between the provisions of this Guide and of those contained in the Energy Supply Laws, the provisions in the Energy Supply Laws shall prevail.

4. STATUTORY REQUIREMENTS

4.1. All electrical wiring plans, drawings and specifications for EVCS shall be prepared and submitted as required by regulation 65 of the Regulations as follows:

- (a) Rated switch gear 60A and less: Wireman /Electrical Supervisor /Electrical Service Engineer /Competent Electrical Engineer /Consulting Engineer

- (b) Rated switch gear 100A and less: Electrical Service Engineer/Competent Electrical Engineer/Consulting Engineer/Electrical Supervisor
- (c) Rated switch gear above 100A: Electrical Service Engineer/Competent Electrical Engineer/Consultant

4.2. Work on electrical installations must be done by persons having the necessary competency as required by section 23 of the Act as below:

23. (1) No installation or electrical plant equipment other than those owned or managed by a supply authority shall be worked or operated except by or under the control of persons possessing such qualifications and holding such certificates as may be prescribed, and no person not possessing the qualifications or holding a certificate as aforesaid shall be in charge of any installation or shall control the operation of any electrical plant or equipment.

(2) Any person who contravenes this section commits an offence and shall, on conviction, be liable to a fine not exceeding ten thousand ringgit and, if the contravention be continued, to a fine not exceeding one thousand ringgit for everyday or part of a day during which the contravention is continued after conviction.

4.3. In line with the safety requirements as well as to safeguard public interests, electrical equipment which have been approved by the Commission and affixed with a predetermined label shall be used as stipulated in Regulation 97 and 98, of the Regulations below:

Regulation 97. Certificate of Approval of equipment.

(1) No person shall manufacture, import, display, sell or advertise—

(a) any domestic equipment;

(b) any equipment which is usually sold direct to the general public; or

(c) any equipment which does not require special skills in its operation. unless the equipment is approved by the Commission.

(2) A Certificate of Approval to manufacture, import, display, sell or advertise the equipment shall be in Forms V and W respectively as prescribed in the First Schedule.

(3) A processing fee of twenty ringgit shall be charged for an application for a Certificate of Approval of any equipment. (4) A fee shall be paid for the Certificate of Approval in subregulation (2) and the renewal thereof at the rate prescribed in Part XIII of the Second Schedule.

Regulation 98. Marking or labelling of approved equipment.

Where an equipment has been approved for manufacture, import, display, sale or advertisement by the Commission, the person to whom a Certificate of Approval has been issued under regulation 97 may be required by the Commission to mark or label the equipment and he shall do so in the manner to be determined by the Commission.

- 4.4 As required by subregulation 15(1) of the Regulations, any apparatus, conductor or accessory for the purpose of connection to an installation shall be sufficient in size, power and number to serve the purpose for which it is intended and shall be installed, arranged, protected, worked and maintained in such a manner as to prevent danger.
- 4.5 The EVCS shall comply with relevant standards as per Appendix 1.

5. INSTALLATION

5.1 Modes of Charging

The four different modes of electric vehicle conductive charging specified in IEC 61851 are explained and illustrated below:

5.1.1 Mode 1

Connection of the EV to the a.c supply network (mains) utilising standardised socket-outlet not exceeding 16A and not exceeding 230 V a.c single phase or 400 V a.c three-phase, at the supply side, and utilising the power and protective earth conductors. This mode uses a standard socket outlet without communication and the presence of a residual current device (RCD). Mode 1 Charging Systems illustrated in Figure 1.

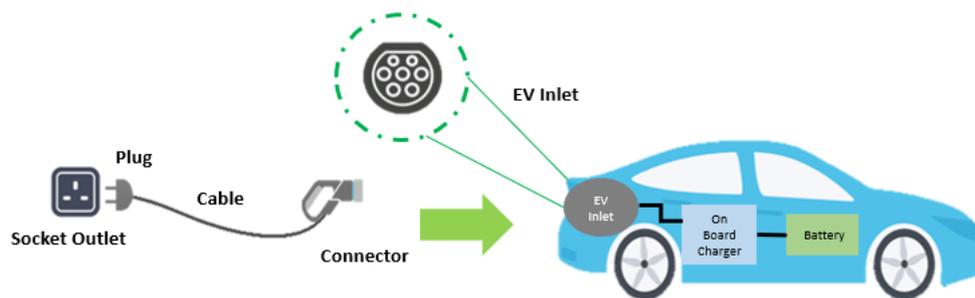


FIGURE 1: Mode 1 Charging System

5.1.2 Mode 2

For Mode 2 charging, an in-cable control box is incorporated into the charging cable assembly. The provision of fixed electrical installation for charging facility is similar to that for Mode 1 except that the final circuit, protective device and socket outlet shall be of a suitable rating to cater for the higher level of charging current not exceeding 32A. Mode 2 Charging Systems illustrated in Figure 2.

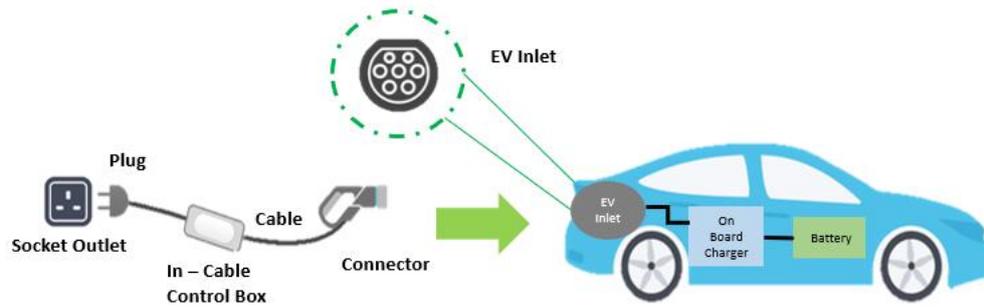


FIGURE 2: Mode 2 Charging System

5.1.3 Mode 3

- a) For mode 3 charging, a dedicated EVCS and a charging cable assembly shall be employed. The control pilot cable of the charging cable assembly allows communication between the EVCS and the on-board charger of an EV to perform functions including verification of connection with the EV, continuous checking of protective earth conductor integrity, energization and de-energization of the supply and selection of charging rate.
- b) Dedicated charging plug, socket and coupler are required for Mode 3 charging, which are specially designed for EV charging.
- c) Subject to the power rating of the on-board charger of an electric vehicle, Mode 3 charging can deliver a higher charging current (e.g. 230V/32A, 400V/32A, 400V/63A) and hence a shorter charging time.
- d) Selection of EVCS shall depend on the charging protocol of the EV and on advice of the EV manufacturer.

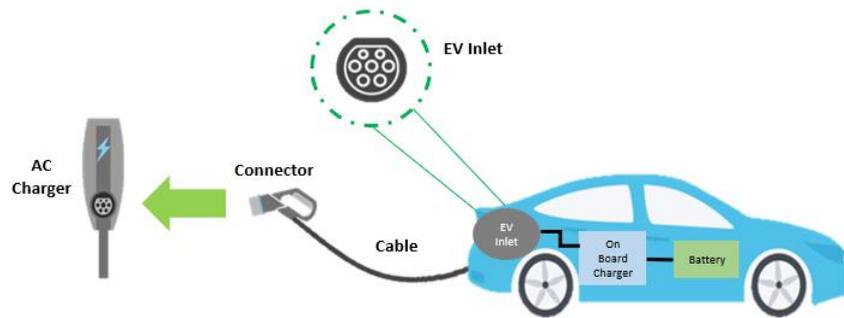


FIGURE 3: Mode 3 (case A connection)

Connection of an EV to the supply network with a plug and cable permanently attached to the EV.

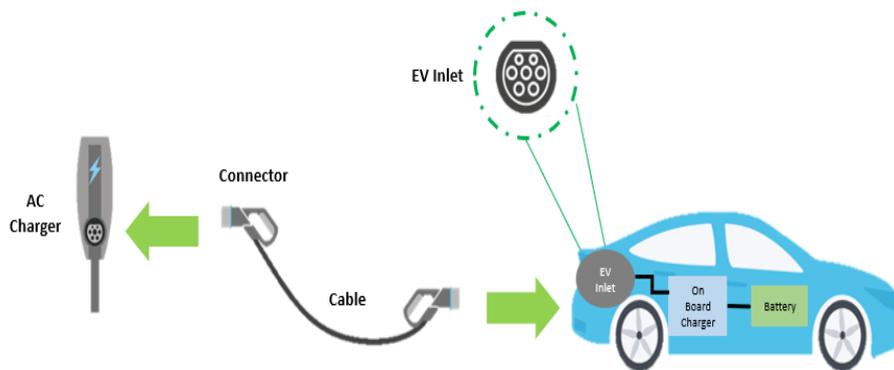


FIGURE 4: Mode 3 (case B connection)

Connection of an EV to a supply network with a cable assembly detachable at both ends.

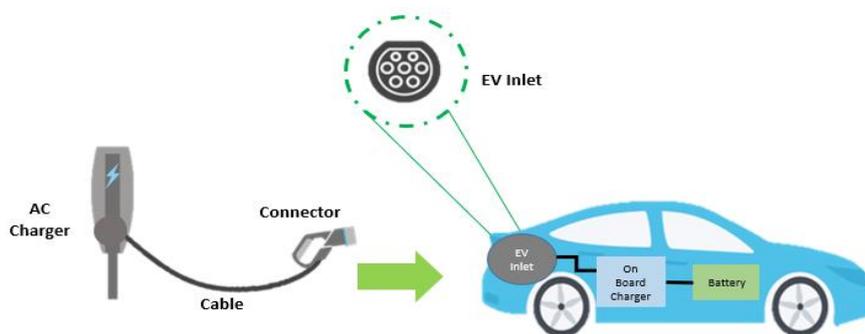


FIGURE 5: Mode 3 (case C connection)

Connection of an EV to a supply utilizing a cable and vehicle connector permanently attached to the EV charging station.

5.1.4 Mode 4

Mode 4 charging employs the principle of using an off-board charger to deliver a DC current directly to the battery bypassing the on-board charger. DC quick charging can charge up an EV in a relatively short time as a substantially higher electrical power ranging from 20kW and above.

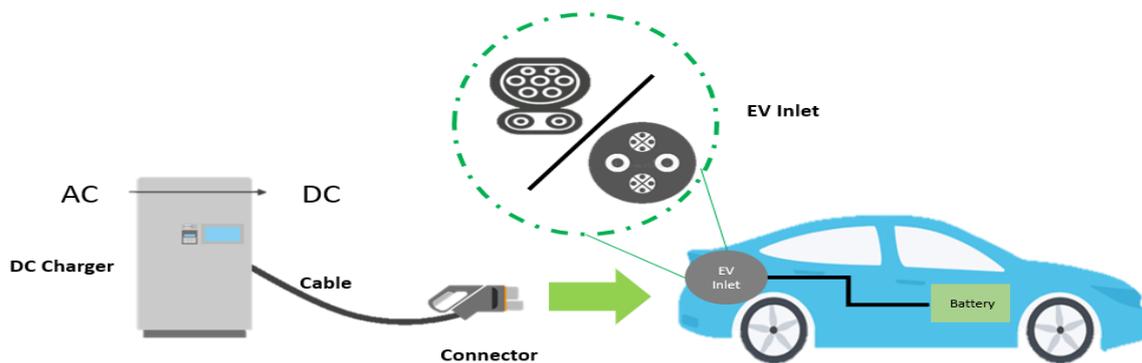


FIGURE 6: Mode 4 Charging System uses of an off-board charger i.e. DC Charger.

5.2 National Compliance

5.2.1 Mode 1 charging is not permitted due to its charging capabilities that does not allows it to stop automatically when its fully charge. Other than that, Mode 1 does not meet minimum safety requirements.

5.2.2 For Mode 2 and 3, only Type 2 connector is allowed to use in EVCS because it has an inbuilt locking mechanism (safety purpose) and can carry single phase and three phase. Type 1 connector is not permitted because it does not have a locking mechanism and can carry single phase.

5.2.3 For Mode 4, CCS Type 2 and CHAdeMO connector is allowed to use in EVCS.

Connector Type	Connector	AC/DC Power	Charging Standard			Vehicle inlet
			Voltage (V)	Current (A)	Power (kW)	
IEC Type 2		AC charging 1Phase/ 3 Phase	230 V ac / 400 V ac	Up to 32 A ac	Up to 22 kW	
Combo CCS Type 2		DC charging	Up to 400 V	Up to 400 A dc	Up to 240 kW	
CHAdeMO		DC charging	Up to 1000 V	Up to 400 A	Up to 400 kW	

FIGURE 7: Table EV Charger Connector and Vehicle Inlet

5.3 Competent Person

5.3.1 All electrical wiring work shall be carried out by competent person working with the Electrical Contractor who is validly registered with the Commission based on the provisions under the Act and the Regulations.

5.3.2 For this matter, Form G (Certificate of Supervision and Completion) and Form H (Certificate of Test) as per the requirements of Regulation 14, Of the Regulations must be completed by a competent person with appropriate category.

5.4 General Guides on EV Charging Facilities

The requirements of the major components of EV charging facility are described below.

5.4.1 Final Circuit

- a) Electric cable for the final circuit shall be protected by means of metal sheath or armor or installed in steel/plastic/PVC conduits. Cable sizing shall be designed according to its current carrying capacity.
- b) The copper conductor size of electric cable for each final circuit shall be selected based on the design current of the EVCS and considering the constraint of voltage drops in the circuit in accordance to its current carrying capacity. A larger size electric cable may be used to facilitate future upgrade.
- c) Cables used in final circuits shall be of continuous length and shall contain no joint.
- d) Sample of circuit is illustrated in Figure 8 &9.

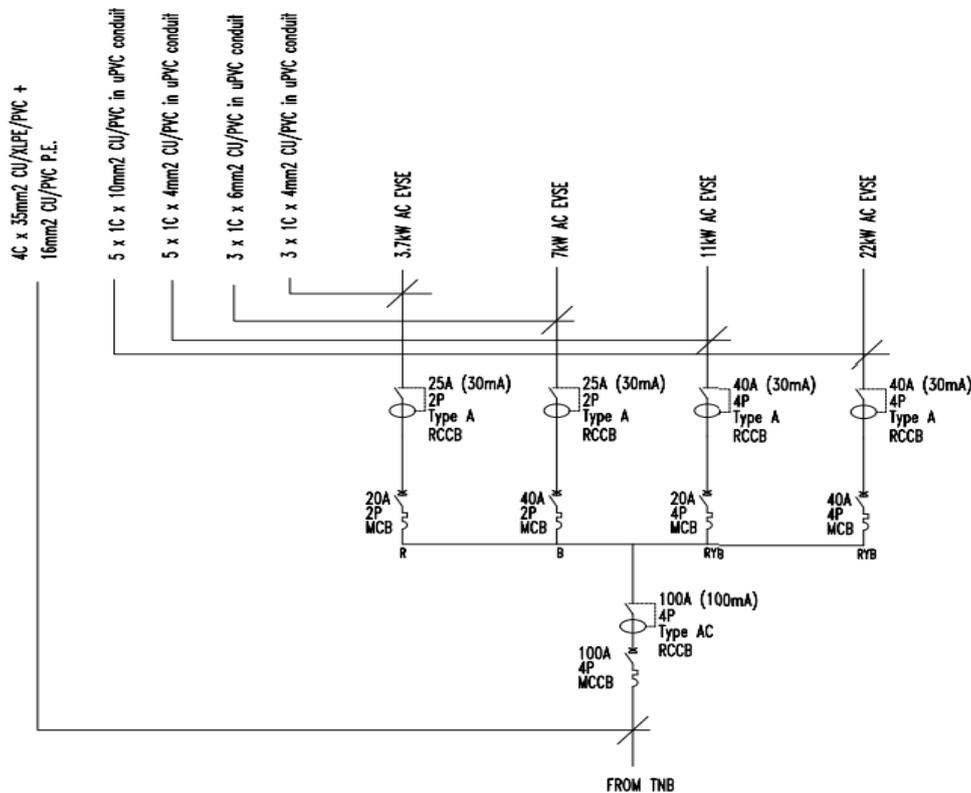


FIGURE 8: Single Line Diagram Example (AC Charging)

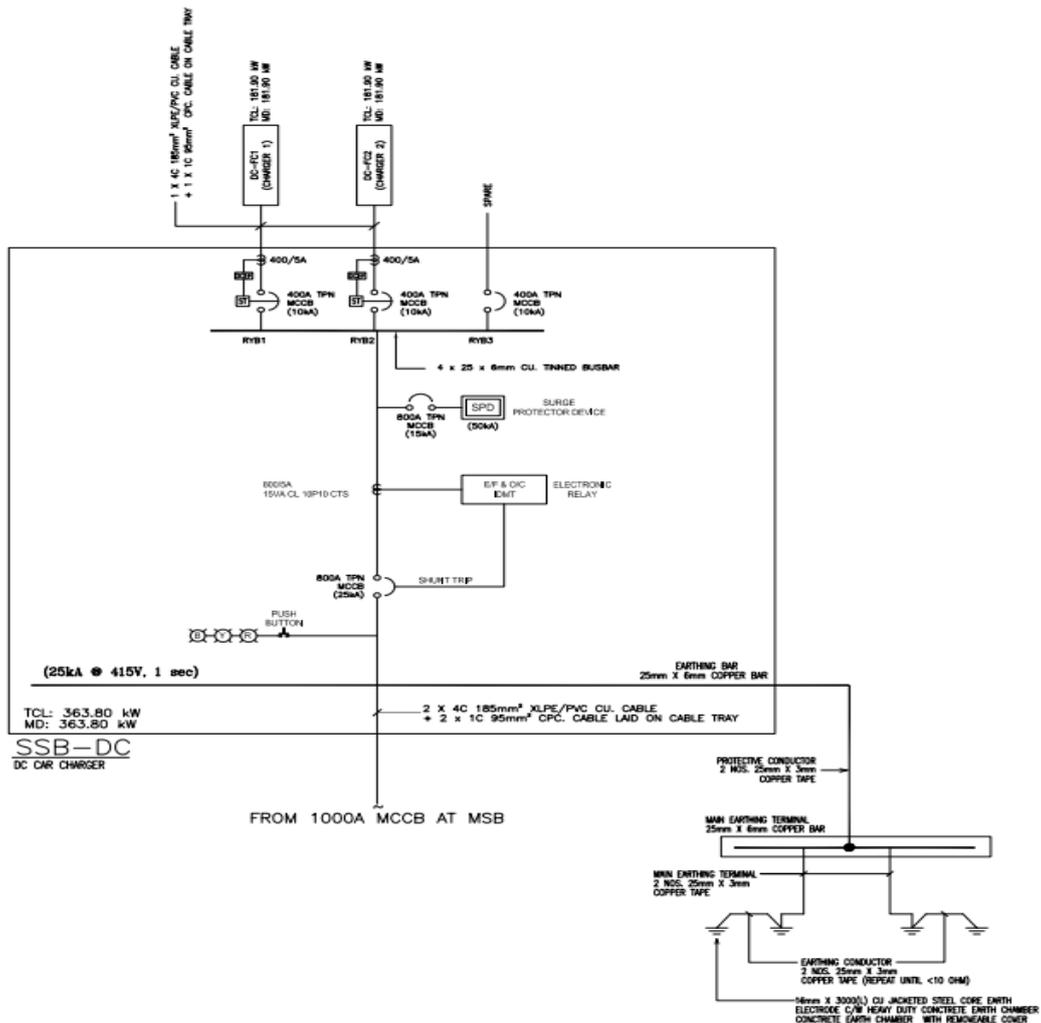


FIGURE 9: Single Line Diagram Example (DC Charging)

5.4.2 Protective Device

- Each final circuit shall be individually protected by a high breaking capacity (HBC) fuse or miniature circuit breaker (MCB) of suitable rating.
- An earth leakage protective device shall be provided for each final circuit. Either a residual current operated circuit-breaker with integral over-current protection (RCBO) or residual current device (RCD) with characteristics of type A or B and residual operating current not exceeding 30mA.
- A current breaking device (an ON/OFF switch or others) shall be provided at the upstream of the socket outlet at the charging facility

for switching on after plugging and switching off before unplugging the charging cable assembly.

- d) Surge Protection Device recommended to be installed in order to protect the equipment from surges.
- e) The circuit must be protected from reverse power flow from EV Batteries in the event of power outage to the installation. Hence, the EVCS systems must be equipped with reverse power flow protection and anti-islanding feature in the charger system unless the EV charger is designed to only allow unidirectional power flow for battery charging.

5.4.3 Earthing

All exposed conductive parts of the electrical installation shall be earthed as required by regulation 34 of the Regulations.

5.4.4 Connector and Adaptor

- a) For Mode 2 charging, socket outlet and the associated plug used shall comply with IEC 60309.
- b) For Mode 3 charging, the type of socket outlet or vehicle connector shall comply to IEC 62196.
- c) Socket outlet shall, in general, be installed at a height of about 1.0 m-1.2m above finished floor level for easy access but the actual level may vary to suit EV user's need and site condition.
- d) EVCS and socket outlet and associated electrical equipment shall be suitably protected from ingress of dust and water to an index of protection of IPX4 for use at indoor car park. An index of protection of IPX4 or higher is required for both plugged and no-plug conditions if the EV charging facility is installed and used in an outdoor environment. The use of a weatherproof enclosure to house both socket outlet and associated electrical equipment is acceptable.

5.4.5 Extension Unit

No extension and multi adaptor unit other than charging cable assembly designed for EV charging shall be used.

5.4.6 Type Test Certificate

EVCS shall be type tested for compliance with the relevant IEC. In addition, if an EVCS is designed for outdoor use, test certificate for ingress protection rating in accordance with IEC 60529. IP 54 (indoor/outdoor) and above shall be available. EVCS suppliers shall be obliged to provide such test certificates.

5.5 EVCS Installation Location Requirement

5.5.1 Single Detached Dwellings

- a) The indoor rated EVSE is allowed for an enclosed garage.
- b) The EVSE shall be put on the outside wall to minimize the distance from the electrical box as well as positioning the EVSE out of the way at the same time.
- c) It is not preferable to locate the EVSE in crowd areas such as walking areas, which could cause accidents such as tripping and bumping hazards.
- d) For a single garage condition, positioning the EVSE at the head of the vehicle can be done to avoid tripping hazards.
- e) The EVSE shall be designed for exterior use to accommodate the outdoor conditions. The installation of adequate lightings and CCTV can be considered for security measures, which can also prevent vandalism.

5.5.2 Multi-Family Dwellings (apartment or condominium)

- a) The EVSE shall be designed to be outdoor rated to adapt the outdoor conditions except the location is safe from the outside environment.
- b) In case the vehicle is parked outside the parking stall, the EVSE shall be placed on the side of the vehicle of any walkway to reduce the tripping hazards. The route for pedestrians shall be made on the backside of the EVSE to ensure their safety.

- c) A wheel stop shall be installed under considerations of normal pedestrian traffic whereby EV parking will not be installed in the crowds' areas. This is to prevent pedestrians tripping over the installed wheel stops when there is no vehicle present.
- d) The building management are encouraged determine the estimated demand from existing occupants for EV charging and additional cabling shall be provided for future extension.

5.5.3 Commercial and Public Access

- a) Some detailed planning is required to place the EV parking and charging area correctly under considerations of current and possible future requirements.
- b) The public charging locations should be focused on sites where the owners of the EV or PHEV can conveniently park their vehicles for a significant amount of time.
- c) Among suggested locations for the above matter are somewhere near public facilities and entertainments such as near the shop lots, malls, restaurants, public parks, sports arenas, and others.

5.6 Other Requirement

- a) An operation instruction for the charging facility including essential information of the rated voltage (V), frequency (Hz), current (A), and number of phases shall be displayed at a prominent location at each of the parking space with EV charging facility.
- b) For Mode 2 charging, a bracket or hanging device for supporting the weight of in-cable control box of the EV charging cable shall be provided as far as practicable to avoid excessive loading on the EV charging cable and plug.
- c) Other advanced features for charging facility such as system energization, charging rate selection, vehicle connection verification, and circuit protective conductor integrity detection may be considered.
- d) Directional signage inside and outside car park is recommended to direct EV drivers to designated parking spaces with EV charging facilities.

- e) Occupancy sensors are useful devices giving indication to drivers on availability of EV charging facility in a public car park and may be considered by the owner of a public car park.
- f) Means of preventing unauthorized usage of the charging facilities such as housing the socket outlet in a padlocked box or using an access card for energizing charging facility etc. may be provided as necessary.
- g) The provision of an indicator light at the charging facility to indicate charging in progress may be provided.
- h) For a car park with multiple charging facilities, provision of wired or wireless communication for group control of the charging facilities may be considered.
- i) CCTV surveillance may be considered to improve security.

6.0 OPERATION

6.1 General Operation

6.1.1 Protection against Vehicle Impact

- a) The EVCS should be installed in a place or position which lowers the risk of the vehicle impact, and necessary protective barriers should be secured.
- b) One recommended equipment for the protection against the vehicle impact is the utilization of the wheel stops to avoid vehicles from contacting the EVCS as well as positioning the EV at the optimum location for efficient charging.

6.1.2 Flood Damage

Two main solutions to minimize the flood damage for the EVCS components are:

- a) avoiding water or any liquid from entering/accumulating inside the vehicles and;
- b) by utilizing the elevation or component protections which are resistant to flood damages.

6.1.3 Signage Requirements

- a) Simple and understandable signages for the indications of the charging stations/facilities should be placed in the easily spotted areas, such as around the public charging stations, workplace areas, parking garages and multi-unit residential complexes, which have access to the EVCS.
- b) The standard signage on public highways, streets, petrol stations, shopping centers and airports must come with signage 'KENDERAAN ELEKTRIK SAHAJA' or 'ELECTRIC VEHICLES ONLY' with pavement markings, painted on the surface of a parking space to indicate the place for charging stations as in Figure 3.

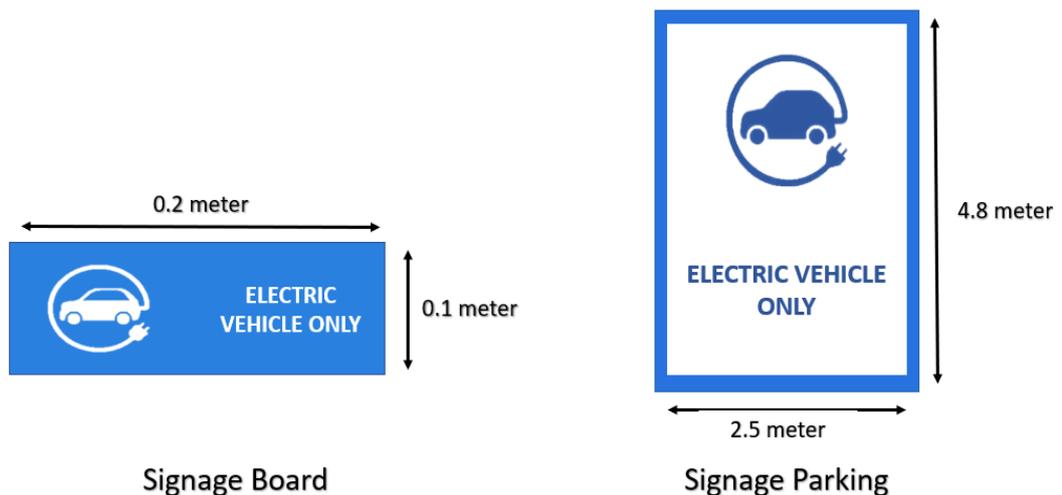


FIGURE 3: Standard Signage

- c) Signage for disable or 'OKU' electric vehicle parking lot recommended.
- d) Caution signage shall be provided to indicate the hazard at the charging stations as in Figure 4.

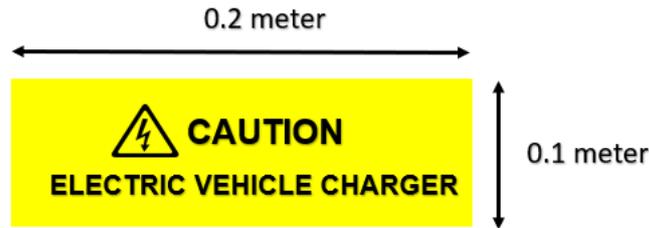


FIGURE 4: Caution Signage

6.1.4 Lighting requirements

- a) The area of the charger station should be sufficient in lighting, such that users and operators can clearly see the signage and operate the charger safely.
- b) Measurement using a lux meter should be performed to ensure that a minimum of 300 lux of lighting is available unless otherwise specified.

6.1.5 The capability of network monitoring for status and fault reports

- a) The current status and condition of the charging station facilities and equipment (in-use, malfunction, etc) shall be reported from time to time for efficient management.
- b) The usage patterns and power consumption may also be monitored on a regular basis.

6.1.6 Instruction to use the charging system

An installer shall provide an instruction to use the EV charging that include indicator status and its meaning.

6.2 Safety Audit Requirement

Employers and Operators of EV charging installations, installation of licensees for retail and licensees for private installation shall ensure that their employees, staff and contractors comply with this part.

6.2.1 Safety Management Programme

- a) Owners and Operators of the non-domestic installations, installation of licensees for retail and licensees for private installation shall establish their Safety Management Programme.
- b) All operational works shall be in accordance with the requirements of this Code and the owner's and/or operator's Safety Management Programme. The procedures shall ensure: –
 - compliance with essential safety requirements and appropriate standards;
 - safety of the occupants of the building and the general public;
 - safety of the employees; and
 - correct operation of the installation.

6.2.2 Reporting of Accidents and Fires

- a) As required by section 33 of the Act, whenever an accident or fire causing or resulting in loss of life or hurt to any person or serious damage to property has occurred in connection with an electrical installation, the owner or the management shall report the accident or fire to the Commission by the quickest means available.
- b) Subsequent to the report as in 7.1.2 (a), with the least possible delay, a report in writing shall be made to the Commission, with the facts of the accident or fire as they are known to the owner or management.
- c) Accidents/fire that shall be notified include: –
 - a fatality (electrocution);
 - an incident where there has been a serious injury (electric shock, fractures, burns, etc.); or
 - serious damage to property

7.0 MAINTENANCE

7.1 General Inspection and Maintenance

7.1.1. Regular inspection of the charging facilities shall be carried out. If repair or maintenance is required, any electrical work shall be carried out by registered electrical contractor and registered electrical worker.

7.1.2. As required by regulation 110 of the Regulations, all parts of the electrical installation shall be maintained to prevent danger to persons and property.

7.1.3. As required by regulation 111 of the Regulations, only competent person or person under the control of competent person shall undertake maintenance work of any equipment which forms part of the installation.

7.1.4. The electrical installation shall be regularly visited and inspected by a competent person as required by regulation 67, of the Regulations.

7.1.5. Electrical appliances used in construction works shall be regularly inspected, tested and maintained to ensure that they remain safe for use. When in use, such electrical appliances shall be protected by protective devices such as residual current device (RCD) and miniature circuit breaker (MCB).

7.1.6. As part of the maintenance procedures, the following shall be prepared by the owner or operator of the electrical installation: –

- a) list of installation assets and their locations;
- b) schedule of maintenance activities to be undertaken, prepared on a risk assessment basis;
- c) record of maintenance activities undertaken;
- d) access requirements for various electrical situations, such as access permits or safety clearances from exposed energized conductors;

- e) isolation and tagging/locking out procedures;
- f) permit to work (PTW) and approval processes;
- g) safety rules to be followed before deciding to work on an energised installation;
- h) an emergency plan (e.g. fire, explosion, electric shock); and
- i) special precautions to be undertaken when working in confined spaces.

7.2 Maintenance Schedules

7.1 All parts of the electrical installation and associated equipment shall be maintained to be in a safe working condition and/or fit for its protection purpose while delivering the services required in a secure and reliable manner. Maintenance schedules shall include: –

- a) inspection and/or testing schedules, shall include the requirements of regulation 67 and regulation 110 of the Regulations;
- b) maintenance schedules; and
- c) replacement schedules for components approaching the end of their operating life.

7.3 Maintenance Record

All records of the design, construction, operation, inspection, testing and maintenance of the electrical installation shall be kept, periodically updated and be accessible to relevant and authorized persons.

7.4 Use of Personal Protective Equipment

7.4.1 Persons undertaking maintenance work shall be trained to be competent in the use of PPE as needed, such as: –

- a) safety helmet with face shield (as appropriate);
- b) safety glasses/face shields (anti flash);
- c) safety boots;

- d) protective clothing;
- e) approved insulating gloves;
- f) safety harness;
- g) approved insulated tools; and
- h) approved insulating sheeting.

7.5 Competent Requirement to Conduct Maintenance

7.5.1 Only registered competent person working with the Electrical Service Contractor or Electrical Contractor is allowed to conduct the maintenance work.

7.5.2 Based on Regulation 14, Regulations, Test Certificate as per in Form H of the Regulations need to be issued, when any testing work is conducted.

8.0 Power Quality

EVCS operation shall not contribute to poor power quality condition such as harmonics, flickers and under voltage to the Distributor's electricity supply it is connected to. The EVCS operation shall meet the operational condition as stated in Distribution Code for Peninsular Malaysia, Sabah & F.T Labuan 2017.

9.0 Licensing

Applicants are to note and comply to the licensing requirements stipulated under the Act and its subsidiary legislations.

License is required under Section 9 of the Act for any person to use, supply, work or operate or permit to be used, worked or operated an EVCS

For licensing purposes, the Guidelines on Licensing Under Section 9 of the Act is referred.

Appendix 1 - EVCS Standards requirement

NO.	INTERNATIONAL STANDARDS	NATIONAL STANDARDS	DETAILS DESCRIPTION
1.	IEC 61851-1:2017	MS IEC 61851-1:2021	Electric vehicle conductive charging system - Part 1: General requirements
2.	IEC 61851-21-1:2017	MS IEC 61851-21-1:2021	Electric vehicle conductive charging system - Part 21-1 Electric vehicle on-board charger EMC requirements for conductive connection to AC/DC supply
3.	IEC 61851-21-2:2018	MS IEC 61851-21-2:2021	Electric vehicle conductive charging system - Part 21-2: Electric vehicle requirements for conductive connection to an AC/DC supply - EMC requirements for off board electric vehicle charging systems
4.	IEC 61851-23:2014	MS IEC 61851-23:2021	Electric vehicle conductive charging system - Part 23: DC electric vehicle charging station
5.	IEC 61851-24:2014	MS IEC 61851-24:2021	Electric vehicle conductive charging system - Part 24: Digital communication between a d.c. EV charging station and an electric vehicle for control of d.c. charging
6.	IEC 61851-25:2020	N/A	Electric vehicle conductive charging system - Part 25: DC EV supply equipment where protection relies on electrical separation
7.	IEC 60364-7-722:2018	N/A	Low-voltage electrical installations - Part 7-722: Requirements for special installations or locations - Supplies for electric vehicles
8.	IEC 61439-7:2018	N/A	Low-voltage switchgear and control gear assemblies - Part 7: Assemblies for specific applications such as marinas,

NO.	INTERNATIONAL STANDARDS	NATIONAL STANDARDS	DETAILS DESCRIPTION
			camping sites, market squares, electric vehicle charging stations
9.	IEC TR 61850-90-8:2016	N/A	Communication networks and systems for power utility automation - Part 90-8: Object model for E-mobility
10.	IEC 61980-1:2020	N/A	Electric vehicle wireless power transfer (WPT) systems - Part 1: General requirements
11.	IEC 62196-1:2014	MS IEC 62196-1:2021	Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 1: General requirements
12.	IEC 62196-2:2016	MS IEC 62196-2:2021	Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 2: Dimensional compatibility and interchangeability requirements for a.c. pin and contact-tube accessories
13.	IEC 62196-3:2014	MS IEC 62196-3:2021	Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 3: Dimensional compatibility and interchangeability requirements for d.c. and a.c./d.c. pin and contact-tube vehicle couplers
14.	IEC TS 62196-3-1:2020	N/A	Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 3-1: Vehicle connector, vehicle inlet and cable assembly for DC charging intended to be used with a thermal management system
15.	IEC 62752:2016+AMD1:2018	N/A	In-cable control and protection device for mode 2 charging of electric road vehicles (IC-CPD)

NO.	INTERNATIONAL STANDARDS	NATIONAL STANDARDS	DETAILS DESCRIPTION
16.	IEC PAS 62840-3:2021	N/A	Electric vehicle battery swap system - Part 3: Particular safety and interoperability requirements for battery swap systems operating with removable RESS/battery systems
17.	IEC 62893-1:2017+AMD1:2020	N/A	Charging cables for electric vehicles for rated voltages up to and including 0,6/1 kV - Part 1: General requirements
18.	IEC 62893-2:2017	N/A	Charging cables for electric vehicles for rated voltages up to and including 0,6/1 kV - Part 2: Test methods
19.	IEC 62893-3:2017	N/A	Charging cables for electric vehicles for rated voltages up to and including 0,6/1 kV - Part 3: Cables for AC charging according to modes 1, 2 and 3 of IEC 61851-1 of rated voltages up to and including 450/750 V
20.	IEC 62893-4-1:2020	N/A	Charging cables for electric vehicles of rated voltages up to and including 0,6/1 kV - Part 4-1: Cables for DC charging according to mode 4 of IEC 61851-1 - DC charging without use of a thermal management system
21.	IEC 62893-4-2:2021	N/A	Charging cables for electric vehicles of rated voltages up to and including 0,6/1 kV - Part 4-2: Cables for DC charging according to mode 4 of IEC 61851-1 - Cables intended to be used with a thermal management system
22.	IEC 62955:2018	N/A	Residual direct current detecting device (RDC-DD) to be used for mode 3 charging of electric vehicles

NO.	INTERNATIONAL STANDARDS	NATIONAL STANDARDS	DETAILS DESCRIPTION
23.	IEC TS 62840-1:2016	N/A	Electric vehicle battery swap system - Part 1: General and guidance
24.	IEC 62840-2:2016	N/A	Electric vehicle battery swap system - Part 2: Safety requirements
25.	IEC 62305-1:2006	MS IEC 62305:2007	Protection Against Lightning - Part 1: General Principles (First Revision)
26	IEC 61000-4-11:2004, MOD	MS 61000-4-11:2015	Testing and measurement methods-Voltage dips, short interruptions and voltage variations immunity tests (Second revision)
27	IEC 61000-4-34:2009, MOD	MS 61000-4-34:2014	Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests for equipment with mains current more than 16 A per phase (First revision)

NOTE:

- (a) If no MS or MS IEC standard exists, the relevant IEC standard shall apply.
- (b) All equipment shall be approved by the Energy Commission if required.

Appendix 2 - List of Energy Commission Regional Offices and Address**LIST OR ENERGY COMMISSION REGIONAL OFFICES AND ADDRESS****ALAMAT PEJABAT SURUHANJAYA TENAGA**

Ibu Pejabat Suruhanjaya Tenaga
No.12, Jalan Tun Hussein
Presint 2, 62100 Putrajaya

Tol Bebas: 1-800-2222-78 (ST)

Web: www.st.gov.my

Pejabat Kawasan	Alamat	Telefon & Faks
Pulau Pinang, Kedah & Perlis	Tingkat 10, Bangunan KWSP 13700 Seberang Jaya, Butterworth Pulau Pinang	Tel: 04-398 8255 Faks: 04-390 0255
Perak	Tingkat 1, Bangunan KWSP Jalan Greentown, 30450 Ipoh, Perak	Tel: 05-253 5413 Faks: 05-255 3525
Kelantan & Terengganu	Tingkat 6, Bangunan KWSP Jalan Padang Garong, 15000 Kota Bharu, Kelantan	Tel: 09-748 7390 Faks: 09-744 5498
Pahang	Tingkat 7, Menara Zenith, Jalan Putra Square 6, 25200 Kuantan, Pahang	Tel: 09-514 2803 Faks: 09-514 2804
Selangor, Kuala Lumpur & Putrajaya	Tingkat 10, Menara PKNS No. 17, Jalan Yong Shook Lin, 46050 Petaling Jaya, Selangor	Tel: 03-7955 8930 Faks: 03-7955 8939
Johor	Suite 18A, Aras 18, Menara ANSAR 65 Jalan Trus, 80000 Johor Bharu, Johor	Tel: 07-224 8861 Faks: 07-224 9410
Pantai Barat Sabah	Tingkat 7, Bangunan BSN Jalan Kemajuan, 88000 Kota Kinabalu, Sabah	Tel: 088-232 447 Faks: 088-232 444
Pantai Timur Sabah	Tingkat 3, Wisma Saban, KM 12, W.D.T., No. 25, 90500 Sandakan, Sabah	Tel: 089-666 695 Faks: 089-660 279
Negeri Sembilan & Melaka	Tingkat 3, Wisma Perkeso, Jalan Persekutuan, MITC, 75450 Ayer Keroh, Melaka	Tel: 06-231 9594 Faks: 06-231 9620