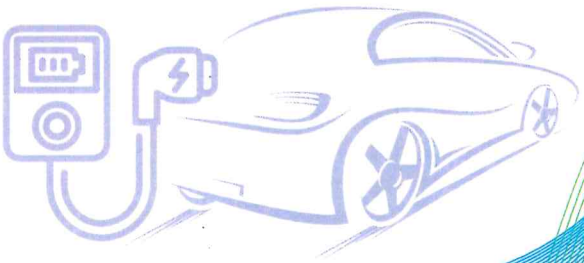
Suruhanjaya Tenaga
Energy Commission

GUIDELINES ON ELECTRIC VEHICLE CHARGING SYSTEM (EVCS)



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Registration Record

Version	Revised By	Revision Date

Suruhanjaya Tenaga
Energy Commission

ELECTRICITY SUPPLY ACT 1990 [ACT 447]

GUIDELINES ON ELECTRIC VEHICLE CHARGING SYSTEM

GP/ST/No. 54/2025

IN exercise of the powers conferred by section 50C of the Electricity Supply Act 1990 [*Act 447*], the Commission issues the following guidelines:

Citation and commencement

1. These guidelines may be cited as the Guidelines on Electric Vehicle Charging System.

2. These Guidelines shall come into operation on the day of its registration.

Purpose

3. These Guidelines describes the following:

(a) manual standard and specification required for the installation of electric vehicle charging system;
(b) the permissible charger mode;
(c) requirement of competent person for EVCS installation;
(d) requirement for manufacturer, importer, person who displays, seller and advertiser; and
(e) procedures for preventive maintenance.

Dated 24 February 2025

SITI SAFINAH BINTI SALLEH
Chief Executive Officer
Energy Commission

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1.0 OBJECTIVES

These Guidelines are issued by the Commission for the following objectives:

(a) to specify the safety requirements for the Electric Vehicle Charging System (EVCS) in accordance with the requirements under the Electricity Supply Act 1990 [*Act 447*];

(b) to outline the relevant standards and method of EVCS application;

(c) to set out the roles, functions and responsibilities of the relevant parties in relation to EVCS's design, installation, operation and maintenance;

(d) to specify the requirement of Certificate of Approval or release letter for the purpose of Electric Vehicle Supply Equipment (EVSE); and

(e) to provide for any other matters which may be or incidental to the requirement of the EVCS.

2.0 APPLICATION

These Guidelines are applicable to:

(a) the Charge Point Operator;

(b) the manufacturer, importer, person who displays, seller and advertiser of the EVSE;

(c) any relevant parties in the implementation and operation of the EVCS including but not limited to the electrical contractor, competent person, EVCS service provider or consulting engineer; and

(d) any party who intends to install, operate and maintain the EVCS.

3.0 INTERPRETATION

3.1 In these Guidelines, the following terms shall bear the following meanings:

"Act"	means the Electricity Supply Act 1990 [*Act 447*];
"Commission"	means the Energy Commission established under the Energy Commission Act 2001 [*Act 610*];
"Charge Point Operator"	means a company or an entity, registered with the Companies Commission of Malaysia, that owns, operates, and maintains one or more charging station or charge point where a electric vehicle can be recharged. The Charge Point Operator is responsible for the installation, management, and ongoing maintenance of the charging station or charge point, ensuring that they are functional, accessible, and properly connected to the electric grid;
"EV"	means an electric vehicle that is powered by an electric motor that draws electricity from a battery and is capable of being charged from an external source;
"EVCS"	means a complete electric vehicle charging system including the EV supply equipment (EVSE) that is required to supply electric energy to an EV for the purpose of charging;

"EVSE"	means an electric vehicle supply 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;
"In-Cable Control and Protection Device (IC-CPD)"	means an assembly of linked parts or components including cables, plug and vehicle connector for supplying electric vehicles in mode 2 charging, which performs control and safety functions;
"licensee"	has the meaning assigned to it under the Act;
"On-board Charger"	means all equipment in the charge power supply chain inside the vehicle;
"Off-board Charger"	means all equipment in the charge power supply chain outside the vehicle;
"Regulations"	means the Electricity Regulations 1994 [*P.U.(A) 38/1994*];

3.2 Subject to paragraph 3.1, the terms adopted and used in these Guidelines shall bear the same meaning as they are defined in the Act.

3.3 If there are any conflict between the provisions of this Guideline and of those contained in the Act, the provisions in the Act shall prevail.

4.0 STATUTORY PROVISION

Any manufacturer, importer, person who displays, seller or advertiser of any EVSE shall comply with the requirements provided under any guidelines or direction issued by the Commission in relation to electrical equipment.

5.0 CHARGING MODE AND RELEVANT STANDARD APPLICATION

5.1 Relevant standard for operating an EVCS

Any party who intends to design, install, operate and maintain the EVCS installation shall adhere to the minimum specified standards as outlined in Appendix 1.

5.2 Types of EV Charging Mode

5.2.1 The four different modes of electric vehicle conductive charging as provided by IEC 61851-1 includes mode 1, 2, 3 and 4. Mode 1 shall not be allowed to be used by any person who intends to design, install, operate and maintain the EVCS installation.

5.2.2 Any person who intends to design, install, operate and maintain the EVCS installation shall only be allowed to use Mode 2, 3 and 4 as below:

(a) **Mode 2**

The Mode 2 charging connection for an EV involves the connection of the EV to an AC supply network (mains) with a current rating not exceeding 32A and a voltage not exceeding 230V AC for single-phase or 400V AC for three-phase at the supply side. This connection utilizes a standardized plug-and-

cable assembly that includes an integrated In-Cable Control and Protection Device (IC-CPD).

The In-Cable Control and Protection Device (IC-CPD) is installed between the plug and the EV as a complete set provides control pilot and safety function. Mode 2 Charging System is illustrated in Figure 1.

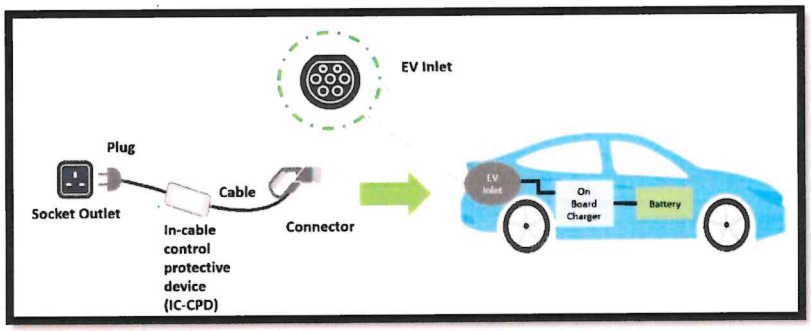

FIGURE 1: Mode 2 Charging System

(b) **Mode 3**

Mode 3 charging is a method for the connection of an EV to an AC EV supply equipment permanently connected to an AC supply network. The charger is equipped with a control pilot function that extends from the AC EV supply equipment to the EV.

The control pilot 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, energisation and de-energisation of the supply and selection of charging rate.

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.

Selection of EVCS depends on the charging protocol of the EV and on advice of the EV manufacturer.

Figure 2 illustrates a Mode 3 (Case A) connection of an EV to the supply network by using a cable and connector which is permanently attached to the EV.

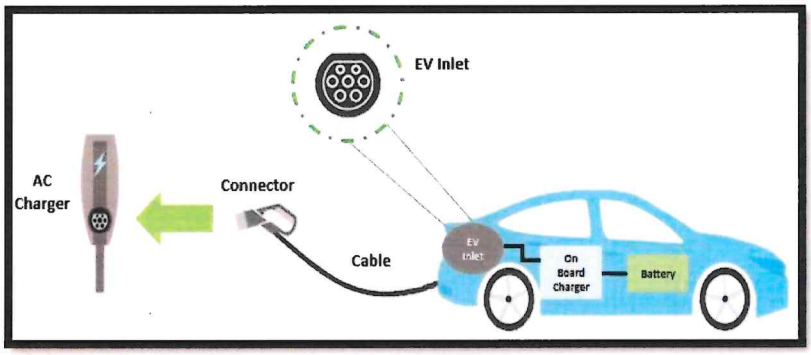

FIGURE 2: Mode 3 (Case A connection)

Figure 3 illustrates a Mode 3 (Case B) connection of an EV to the supply network by using a cable assembly detachable at both ends to the EV.

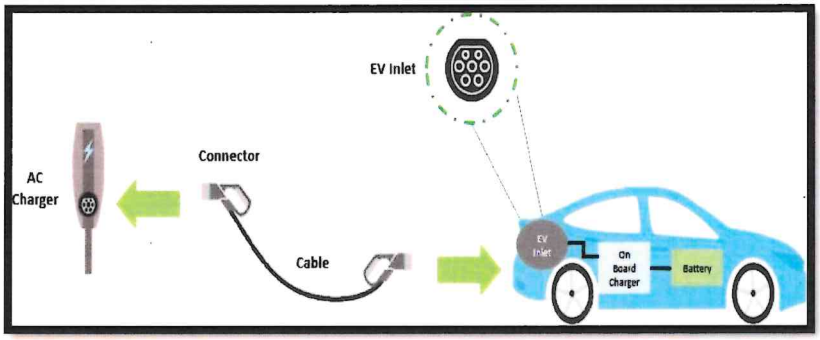

FIGURE 3: Mode 3 (Case B connection)

Figure 4 illustrates a Mode 3 (Case C) connection of an EV to the supply network by using a cable and connector permanently attached to the EV charging station.

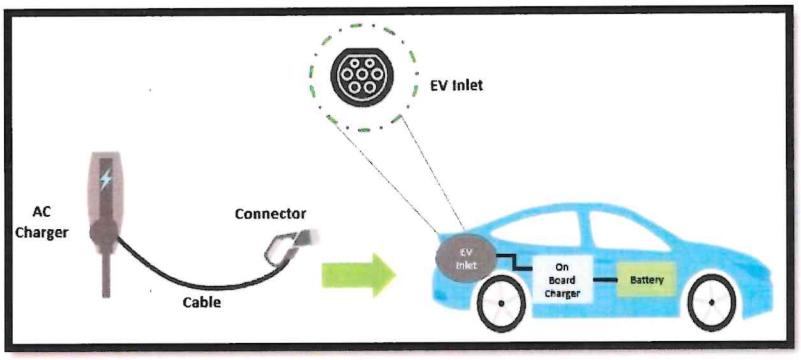

FIGURE 4: Mode 3 (Case C connection)

(c) **Mode 4**

Mode 4 charging is a method for the connection of an EV to an AC or DC supply network utilizing a DC EV supply equipment, with a control pilot function that extends from the DC EV supply equipment to the EV.

Figure 5 illustrates a Mode 4 connection of an EV to the supply network by using an off-board charger to deliver a DC current directly to the EV battery and by passing the on-board charger.

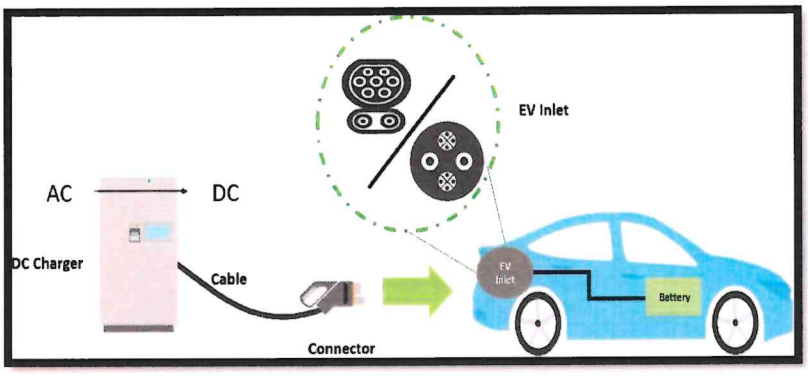

FIGURE 5: Mode 4 Charging System uses of DC off-board charger

5.3 ELECTRIC VEHICLE SUPPLY EQUIPMENT

5.3.1 Permissible Charger Connector

Table 1 illustrates the permissible charger connector types for different mode of charging connection. For Mode 2 and 3, the permissible connector is Type 2 operating in alternating current (AC). Whereas for Mode 4, the permissible connector is Combo CCS Type 2 and CHAdeMO operating in direct current (DC).

TABLE 1: Permissible EV Charger Connector

Connector Type	Connector	Type of Current	Type of Mode	Charging Standard	
				Max rated Voltage (V)	Max. rated Current (A)
Type 2		AC	2 and 3	230V AC / 400V AC	Up to 32A AC / Up to 63A AC
Combo CCS Type 2		DC	4	1000V DC	400A DC
CHAdeMO		DC	4	1000V DC	400A DC

5.3.2 Socket Outlet and Plug

(a) The selection of socket outlet shall adhere to the specification outlined in IEC 62196.

(b) For Mode 2 charging connection, the installation of the socket outlet and associated plugs shall adhere to the specifications outlined in MS 589-1, BS 1363-1, MS 1577 or IEC 60309.

(c) For Mode 3 and 4 charging connection, the installation of the charging cable, connector and its relevant equipment shall adhere to specifications outline in Appendix 1.

(d) The socket outlet can be installed with a minimum 1.2 meter height above finished floor. The specific positioning may be adjusted as necessary to accommodate the preferences of EV users and the prevailing site conditions.

5.3.3 Ingress Protection

The enclosures of the EV supply equipment shall possess a minimum IP rating in accordance with IEC 60529, as follows:

(a) indoor use at least IP41; and
(b) outdoor use at least IP44.

5.4 Requirement for Manufacturer, Importer, Person Who Displays, Seller and Advertiser

Any person who intends to manufacture, import, display, sell or advertise the EVSE must ensure that their obligations under the regulation 97 of the Regulations are fulfilled by obtaining the;

(a) Certificate of Approval for Mode 2 and Mode 3; or
(b) a release letter for Mode 4.

6.0 INSTALLATION OF EVCS

6.1 Competent Person Requirement

6.1.1 All electrical wiring work need to be carried out by the respective competent person in accordance with the

Regulations.

6.1.2 The respective competent person and any person under his control are responsible to comply with any standard or specification provided under these Guidelines in relation to any design used in, construction or operation of EVCS.

6.2 Protection for EVSE

Outlined below are the primary safety components of the EVSE such follows:

6.2.1 Final Circuit

(a) The EVSE or the socket outlet for EV charging shall be powered by a dedicated final circuit.

(b) The electric cable for the dedicated final circuit shall be protected by means of metal sheath or armoured, or installed in steel / PVC conduits.

(c) Surface type electrical wiring must be protected through trunking or cable tray use PVC/PVC or XLPE/PVC cable type.

(d) The conductor size of the cable for each dedicated final circuit shall be selected based on the design of the EVSE requirement with references to IEC 60364-5-52.

(e) Cables used in dedicated final circuits shall be of continuous length without any joint.

(f) Sample of circuit is illustrated in Figure 6 and 7.

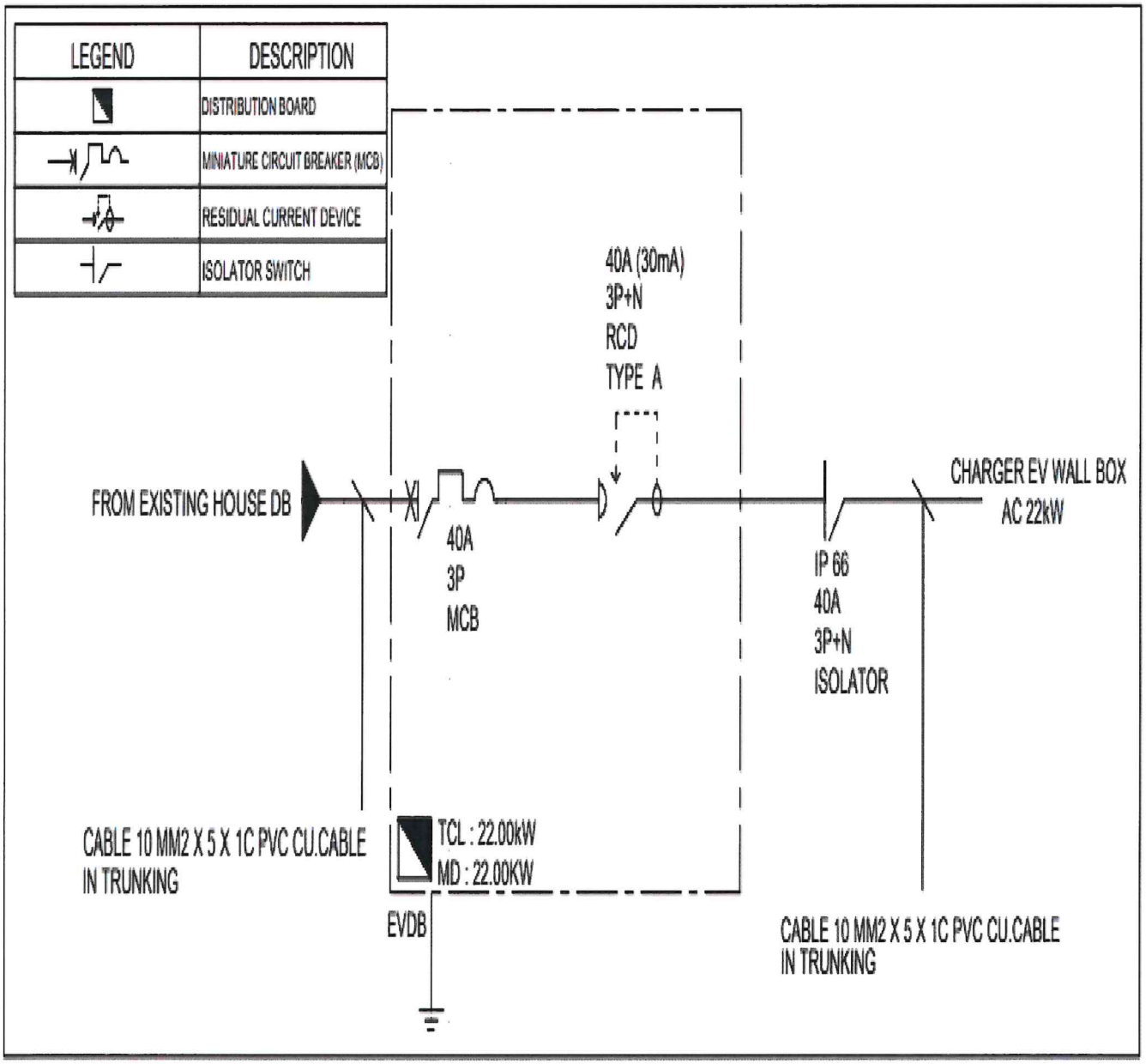

FIGURE 6: Single Line Diagram Example (AC Charging)

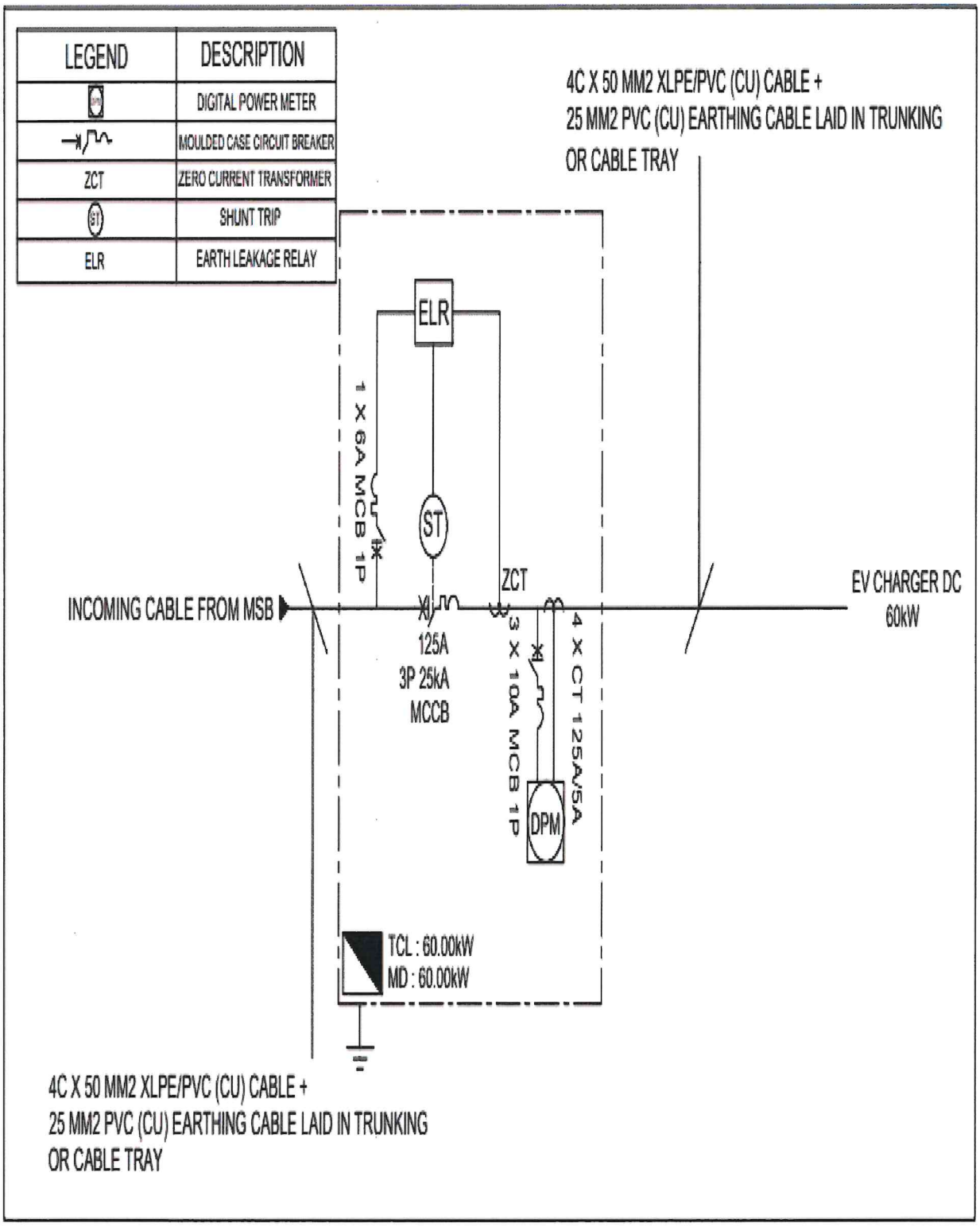

FIGURE 7: Single Line Diagram Example (DC Charging)

6.2.2 Protective Device

(a) The final circuit shall be protected from earth leakage and over current. Each final circuit need to be individually protected by a protective device:

i. Overcurrent Protective Device (OCPD) such as Miniature Circuit Breaker (MCB) or Moulded Case Circuit Breaker (MCCB) or Fuse of suitable rating; and

ii. Residual Current Device (RCD) which rating indicated in Table 2.

TABLE 2: The RCD type and rating

CIRCUIT	TYPE
less than 100A	Residual operating current not exceeding 30mA shall be installed using: Type A or B of residual current circuit breaker (RCCB) or residual current circuit breaker with integral over-current protection (RCBO);
100A or more	Using: Earth Leakage Relay (ELR); or Earth Fault Relay (EFR); and Over Current Relay (OCR).

(b) For Mode 2, a current breaking device (i.e. socket outlet or similar device) need to be provided at the charging point for switching on after plugging and switching off before unplugging the charging cable assembly.

(c) For Mode 3 and 4, EVSE communication medium device to display the activity of switching on and switching off.

(d) The circuit need to be protected from reverse power flow from EV batteries in the event of power outage to the installation. EVCS need to 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.

7.0 MAINTENANCE OF EVCS

7.1 Maintenance Schedules and Record

7.1.1 Regular inspection of the EVCS need to be carried out based on the manual operation recommended by manufacturer.

7.1.2 All parts of the electrical installation and associated equipment of the EVCS are to be maintained in a safe working condition and fit for its protection purpose while delivering the services required in a secure and reliable manner.

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

7.2 Use of Personal Protective Equipment (PPE)

A competent person who undertakes any electrical work is required to use and ensure the use of the appropriate PPE, whenever the circumstances shall required.

8.0 LICENSING REQUIREMENT OF EVCS

Any person who carry out any activity stipulated under subsection 9(1) of the Act in relation to the EVCS shall obtain a licence in accordance with the requirements under the Act and any subsidiary legislation made under it.

Appendix 1 - EVCS Standards

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 61851-23:2023	MS IEC 61851-23:2021	Electric vehicle conductive charging system - Part 23: DC electric vehicle charging station
5	IEC 61851-24:2023	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 60364-5-52:2009	N/A	Low-voltage electrical installations - Part 5-52: Selection and erection of electrical equipment - Wiring systems

No.	INTERNATIONAL STANDARDS	NATIONAL STANDARDS	DETAILS DESCRIPTION
8	IEC 60364-7-722:2018	N/A	Low-voltage electrical installations - Part 7-722: Requirements for special installations or locations - Supplies for electric vehicles
9	IEC 61439-7:2022	N/A	Low-voltage switchgear and control gear assemblies - Part 7: Assemblies for specific applications such as marinas, camping sites, market squares, electric vehicle charging stations.
10	IEC 61980-1:2020	N/A	Electric vehicle wireless power transfer (WPT) systems - Part 1: General requirements
11	IEC 62196-1:2022	MS IEC 62196-1:2021	Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 1: General requirements
12	IEC 62196-2:2022	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 62196-3:2022	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

No.	INTERNATIONAL STANDARDS	NATIONAL STANDARDS	DETAILS DESCRIPTION
			with a thermal management system
15	IEC62752:2016+AMD1: 2018	N/A	In-cable control and protection device for mode 2 charging of electric road vehicles (IC-CPD)
16	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
17	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
18	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
19	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
20	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
21	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
22	IEC TS 62840-1:2016	N/A	Electric vehicle battery swap system - Part 1: General and guidance
23	IEC 62840-2:2016	N/A	Electric vehicle battery swap system - Part 2: Safety requirements
24	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
25	IEC 62305-1:2006	MS IEC 62305:2007	Protection Against Lightning - Part 1: General Principles (First Revision)
26	IEC60529:1989+AMD1: 1999+AMD2:2013	N/A	Degrees of protection provided by enclosures (IP Code).
27	BS 1363-1:2016+A1:2018	MS 589-1:2018	13 A Plugs, socket-outlets, adaptors and connection units - Part 1: Specification for rewirable and non-rewirable 13 A fused plugs (Fourth revision)
28	N/A	MS 1577:2022	Specification for 15A plugs and socket-outlets for domestic and similar purposes
29	IEC 60309-1:2021	MS IEC 60309-1:2013	Plugs, fixed or portable socket-outlets and appliance inlets for industrial purposes - Part 1: General requirements
30	IEC 60309-2:2021	MS IEC 60309-2:2013	Plugs, fixed or portable socket-outlets and appliance inlets for industrial purposes - Part 2: Dimensional compatibility requirements for pin and contact-tube accessories

NOTE:

Regulated electrical equipment are to be tested to the specified standards. Equipment that are tested and certified to the same standards of later revisions are also acceptable.