

Draft Safety Provisions for Electric Vehicle (EVs) Charging Stations

1. Scope:

These provisions applies to AC and DC charging Points with standard A.C. supply voltages and D.C. supply voltages for providing power supply to Electric Vehicle (EV).

2. Definitions:

In these guidelines, unless the context otherwise requires,

- i. **Electric vehicle charging station:** As per CEA (Technical Standards for connectivity of Distributed Generation Sources) Regulations, 2013.
- ii. **Charging point:** As per CEA (Technical Standards for connectivity of Distributed Generation Sources) Regulations, 2013.
- iii. **Electric vehicle (EV):** any vehicle propelled, partly or wholly, by an electric motor drawing current from a rechargeable storage battery, or from other portable energy storage devices (rechargeable, using energy from a source off the vehicle such as a residential or public electricity service).
- iv. **Electric vehicle supply equipment (EVSE):** conductors including the phase, neutral and protective earth conductors, the EV couplers, attachment plugs and all other accessories devices, power outlets, safety function equipment, or apparatus installed specifically for the purpose of delivering energy from the premises wiring to the EV and allowing communication between them if required.
- v. **Supply lead / Cable Assembly:** means a piece of equipment used to establish the connection between the EV and either a socket-outlet or a charging point.
- vi. **Socket-outlet:** means an electrical device that is for fixing at a point where fixed wiring terminates; and provides a detachable connection with the pins of a plug; and has two or more contacts; and also includes a cord extension socket attached to a flexible cord that is permanently connected to installation wiring;
- vii. Words and expressions used and not defined in these provisions but defined in the Electricity Act shall have the meanings respectively assigned to them in the Electricity Act, 2003 and CEA Safety Regulation (Measures relating to Safety and Electric Supply) Regulations, 2010 (as amended).

3. General safety requirement for electric vehicle charging stations:

- (i) All EV charging stations shall be designed, installed, tested, certified, inspected and connected in accordance with these provisions.
- (ii) All EV charging stations shall be provided with protection against the overload of input supply and output supply fittings.
- (iii) All EV charging stations shall be installed so that any socket-outlet of supply is at least 800 mm

above the finished ground level.

- (iv) A cord extension set or second cable assembly shall not be used in addition to the cable assembly for the connection of the EV to the Electric Vehicle Charging Point. A cable assembly shall be so constructed so that it cannot be used as a cord extension set.
- (v) Adaptors shall not be used to connect a vehicle connector to a vehicle inlet.
- (vi) EV parking place should be such that the connection on the vehicle when parked for charging shall be within 5 metre from the EV charging Point.

Note: maximum length of the supply lead is 5m.

- (vii) Portable socket-outlets are not permitted to be used for EV charging.
- (viii) Suitable lightning protection system shall be provided for the EVs charging stations as per IS/IEC 62305.
- (ix) The EVs charging stations shall be equipped with a protective device against the uncontrolled reverse power flow from vehicle.
- (x) **Disconnection of EV:** One second after having disconnected the EV from the supply (mains), the voltage between accessible conductive parts or any accessible conductive part and earth shall be less than or equal to 42.4 V peak (30 V rms) , or 60 V D.C., and the stored energy available shall be less than 20 J (as per IEC 60950). If the voltage is greater than 42.4 V peak (30 V rms) or 60 V D.C., or the energy is 20 J or more, a warning label shall be attached in an appropriate position on the charging stations.
- (xi) **Locking of the coupler:** A vehicle connector used for D.C. charging shall be locked on a vehicle inlet if the voltage is higher than 60 V D.C. The vehicle connector shall not be unlocked (if the locking mechanism is engaged) when hazardous voltage is detected through charging process including after the end of charging. In case of charging system malfunction, a means for safe disconnection may be provided.
- (xii) **Protection against overvoltage at the battery:** The D.C. EV charging point shall disconnect supply of electricity to prevent overvoltage at the battery, if output voltage exceeds maximum voltage limit sent by the vehicle.
- (xiii) **Verification of Vehicle Connector Voltage-** The EV Charging station shall not energize the charging cable when the vehicle connector is unlocked. The voltage at which the vehicle connector unlocks shall be lower than 60 V.

4. **Earth protection system for charging stations:**

- (i) All Residual Current Device (RCDs) for the protection of supplies for EVs shall have a residual operating current of not greater than 30 mA and shall operate to interrupt all live conductors, including the neutral.
- (ii) All RCDs used for the protection of supplies to EVs shall be permanently marked to identify their function and the location of the charging station or socket outlet they protect.
- (iii) Each EV charging station shall be supplied individually by a dedicated final sub-circuit protected

by an overcurrent protective device complying with IEC 60947-2, IEC 60947-6-2 or the IEC 60269 series. The overcurrent protective device shall be part of a switchboard.

- (iv) Co-ordination of various protective devices shall be required.
- (v) Where required for service reasons, discrimination (selectivity) shall be maintained between the RCD protecting a connecting point and an RCD installed upstream.
- (vi) All EV charging stations shall be supplied from a sub-circuit protected by a voltage independent RCD and also providing personal protection that is compatible with a charging supply for an electric vehicle.
- (vii) All EV charging stations shall be provided with an earth continuity monitoring system that disconnects the supply in the event that the earthing connection to the vehicle becomes ineffective.
- (viii) Earthing of all EV charging stations shall be TN system as per IS 732.
- (ix) The cable may be fitted with an earth-connected metal shielding. The cable insulation shall be wear resistant and maintain flexibility over the full temperature range.
- (x) **Detection of the electrical continuity by the protective conductor:** A protective earth conductor shall be provided to establish an equipotential connection between the earth terminal of the supply and the conductive parts of the vehicle. The protective conductor shall be of sufficient rating to satisfy the requirements of IEC 60364-5-54

5. **Requirement to prevent fire for EVs Charging Stations.-**

- (i) Firefighting system for EVs Charging Stations shall be as per relevant provisions of CEA (Measures Relating to safety and Electric Supply) Regulations 2010.
- (ii) Enclosure of charging stations shall be made of fire retardant material with self-extinguishing property and free from Halogen.
- (iii) Fire detection, alarm and control system shall be provided as per relevant IS.

6. **Testing of EVs charging stations:**

- (i) All apparatus of EV Charging Station shall have the insulation resistance value as stipulated in the relevant IEC 61851-1.
- (ii) Any testing as specified in the manufacturer's instructions for the RCD and the EV charging station.

7. **Maintenance of Records:**

- (i) To be tested/inspected by owner/ electrical Inspector/ CESE and keep records that the EV charging station has been designed, constructed and labelled to be compatible with a supply of standard voltage at a nominal frequency of 50 Hertz;
- (ii) Keep records of the relevant test certificate as indicated in these guideline and as per IEC 61851 standard.

8. Periodic maintenance and assessment of electric vehicle charging stations:

- (i) An electric vehicle charging station operator shall arrange periodic test/ inspection of an EV charging station or EVSE should be carried out by electrical inspector/CESE in every four years.
- (ii) The owner/operator shall establish and implement a safety assessment programme for regularly assessing the electrical safety of EVSE, conductors and fittings.
- (iii) The owner/operator shall keep records of the results of every periodic assessment and details of any issues found during the assessment; and any actions required to be taken in relation to those issues.
- (iv) The owner/operator shall retain a copy of all records, whether in hard copy or electronically, for at least seven years and shall provide a copy of the records to the inspecting officers.

9. International Standard for charging stations:

- (i) Safety provisions of all A.C. charging stations shall in accordance with IEC 61851-1, IEC 61851-21, IEC 61851-22 and IEC 61851-24.
- (ii) Safety provisions of all D.C. charging stations shall in accordance with IEC 61851-1, IEC 61851-21, IEC 61851-23 and IEC 61851-24
- (iii) Where the connection point is installed outdoors, or in a damp location, the equipment shall have a degree of protection of at least IPX4 in accordance with IEC 60529.