

29.10. **Annexure 10: Specifications of EV Chargers**

The empanelment shall be done only for the following EV chargers:

1. AC001
2. LEV AC*
3. DC001

The specifications of the EV Chargers have been given below.

1. AC001

As per order from Department of Heavy Industry, Ministry of Heavy Industries & Public Enterprises, dated 21st November 2017, Reference No. 7(8)/2015-AEI(pt.)(11976)¹

| Sl. No. | Parameter | Specifications |
|-----------------------------------|-----------------------------|---|
| General Requirements | | |
| 1. | EVSE Type | AC |
| 2. | Energy Transfer Mode | Conductive |
| Input Requirements | | |
| 3. | AC Supply System | Three-Phase, 5 Wire AC System (3Ph.+N+PE) |
| 4. | Nominal Input Voltage | 415V (+6% and -10%) as per IS12360 |
| 5. | Input Frequency | 50Hz, +/-1.5Hz |
| 6. | Input Supply Failure Backup | Battery backup for minimum 1 hour for the control system and billing unit. Data logs should be synchronized with CMS during back up time, in case battery drains out. |
| Environmental Requirements | | |
| 7. | Ambient Temperature Range | 0 °C to +55 °C |
| 8. | Ambient Humidity | 5 to 95% |
| 9. | Ambient Pressure | 86kpa to 106kpa |

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| 10. | Storage Temperature | 0 °C to +60 °C |
| Mechanical Requirements | | |
| 11. | Suggested cable Security | Public metered AC outlet (PMAO) and the vehicle connector outlet to have provision for locking mechanism during charging to ensure the safety of the cable |
| 12. | Mechanical Stability | Shall not be damaged by mechanical impact energy: 20J (5kg at 0.4m) |
| 13. | IP Rating | IP 54 |
| 14. | Cooling | Air cooled or forced air cooled to protect the equipment against temperature hazards |
| Output Requirements | | |
| 15. | Number of outputs | 3 |
| 16. | Type of each outputs | 230V (+6% and -10%) single phase, 15A as per IS12360 A.C |
| 17. | Output Details | 3 Independent charging sockets |
| 18. | Output Current | Three Vehicles charging simultaneously, each at 15A current |
| 19. | Output Connector Compatibility | IEC 60309 |
| 20. | Limiting output current | Circuit breaker for each outlet limited to 16A current output. Breaker should be reset to resume operation. |
| 21. | Connector Mounting | Angled connector mounted looking downwards for outdoor use |
| 22. | Isolation | Class 1 and Class 2 insulation as per AIS 138 (3.3.1 and 3.3.2) |
| User Interface & Display Requirements | | |
| 23. | ON-OFF (Start-Stop) switches | Mandatory |
| 24. | Emergency stop switch | Mushroom headed Push Button Type (Red |

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| | | Colour), visible and easily accessible |
| 25. | Visual Indicators | Error indication, Presence of input supply indication, Charge process indication and other relevant information |
| 26. | Display Size | Minimum 3.5" inches with 720x480 pixels, user interface through touch screen/keypad |
| 27. | Display Messages | <p>EVSE should display appropriate messages for user during the various charging states like</p> <ul style="list-style-type: none"> • Vehicle plugged in/ vehicle plugged out • Fault conditions, metering, unit consumption, duration since start of charge, time to charge, kWh |
| 28. | User Authentication | Using mobile application or User Interface (OCPP gives only a field mandate, media to be used is open) |
| 29. | Metering Information | Consumption Units |
| Billing & Payment Requirements | | |
| 30. | Metering | Metering as per units' consumption for charging each vehicle |
| 31. | Billing | Grid responsive billing |
| 32. | Payment | BHIM/ Bharat QR or UPI compliant mobile application payment |
| Communication Requirements | | |
| 33. | Communication between EVSE and Central Server | Open Charge Point Protocol (OCPP) 1.5 protocol or higher version compatible to OCPP 1.5 |
| 34. | Metering | Grid responsive metering as per units' consumption of each vehicle |
| 35. | Interface between charger and central management system (CMS) | Reliable internet connectivity |

| Protection & Safety Requirements | | |
|----------------------------------|--------------------------|---|
| 36. | Safety parameters | Safety and protection to be ensured for India specific environment (as per AIS 138 part 1) |
| 37. | Start of Charging | <ul style="list-style-type: none"> • The outlet will be locked and covered, the connector will be exposed to charging only after user authentication using user interface or mobile application. • Only when the lock opens and connector is properly connected, the switch/relay will turn ON to feed power to the EV. Lock will be opened only after full charging and authentication by user or the operator. Once disconnected, the charging session terminates. |
| 38. | Power failure | If there is a power failure, user is indicated about this. The charging resumes when power comes on. If the user wants to terminate the session during power failure, the user can shut-off the switch and remove the plug. |
| 39. | Interruption of Charging | <ul style="list-style-type: none"> • Connector terminals to be mounted with temperature sensors to avoid burning of the connectors. Safety mechanism to trigger switching off the charging at temperature > 80°C for a duration <10s. In such situation, an appropriate signal will be sent to turn the switch/relay OFF to stop the charging. Once disconnected, the charging session terminates. • If the above locking mechanism is mandated then the following point won't be required: If plug is taken out (for more than 2 seconds) and then reinserted for charging, the charging session will disconnect. A new session will be required to continue charging to ensure that no one can remove a |

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| | | vehicle being charged and insert their own cable and use the infrastructure without paying or at someone else's account. |
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Type Testing

| Sl. No. | Criteria | Parameter | Clause No. of AIS 138 Part 1 |
|---------|-------------------------------|---|------------------------------|
| 1. | Safety functions Verification | Earth Presence Detection (Socket - EVSE) | 6.4.1.1 |
| | | Earth Continuity Check (EVSE-EV) | 6.4.1.2 |
| | | Over Current and Short-Circuit Protection | 6.4.1.5 |
| | | Leakage Current (RCD) | 6.4.1.6 |
| | | Dielectric withstand voltage | 11.6.1 |
| 2. | Mechanical Stability | Mechanical impact | 11.11.2.2 |
| | | IP Testing | 11.11.2.4 |
| 3. | Climatic environmental tests | Ambient air temperature | 11.11.1.2 |
| | | Ambient humidity | 11.11.1.4 |
| 4. | EMC Verification | Immunity to electrostatic discharges | 11.11.3.2 |
| | | Supply voltage dips and interruptions | 11.11.3.2 |
| | | Fast transient bursts | 11.11.3.2 |
| | | Voltage surges | 11.11.3.2 |

LEV AC

As per letter, from Department of Science and Technology (DST) to Dialogue and Development Commission of Delhi (DDCD), dated 14th January 2021, Reference No. G-30011-44/2020-PROJ.

| Sl. No. | Parameter | Specifications |
|-------------------------------------|---|---|
| General Requirements | | |
| 1. | Charger Type | AC |
| 2. | Energy Transfer Mode | Conductive |
| 3. | Number of Output Ports | One |
| 4. | Input Supply | Single Phase, 50 Hz, 230 V AC +10% |
| 5. | Charging Outlet | Single Phase, 50 Hz Rated Voltage: 230V AC Maximum Current: 15A |
| 6. | EV AC Charge Point Socket – Outlet and Plug | As per IS/IEC 60309-1:2002 |
| 7. | Energy Measurement | Required, with 2% accuracy |
| 8. | Mounting Arrangement | Pole or wall mounted |
| 9. | Operating Temperature | -5 °C to +55 °C |
| Communication & Protocol | | |
| 10. | Communication | With Mobile App using Bluetooth Low Energy (BLE) 4.0 |
| 11. | Protocol | Shall be compatible to standardize Mobile Application protocol |
| User Interface Requirements | | |
| 12. | User Authentication | Through Mobile Phone Application |
| 13. | Charging Start/Stop Operation | Through Mobile Phone Application |
| 14. | Visual Indicators | Presence of input supply, Presence of earth, Charge process indication, Authentication status, Back-up power enabled, etc. at least through LED |

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| | | indicators with appropriate colour coding. |
| 15. | Trigger for pairing through BLE in case of Power Failure | Mobile phone pairing using push button type of a switch or any other suitable means to complete the charging session with actual energy consumed feedback with backup power in case of power failure. |
| 16. | Energy Measurement Information | Through Mobile Phone Application |
| Protections | | |
| 17. | Electric Shock Protection function | Residual Leakage current detection, Trip time: Nominal 30ms Trip current: Nominal 30mA |
| 18. | Short-Circuit Protection function | Required |
| 19. | Overhead Protection function | Required |
| 20. | Type Testing Requirements | As per approved BIS standards whenever notified |

3. DC001

As per order from Department of Heavy Industry, Ministry of Heavy Industries & Public Enterprises, dated 21st November 2017, Reference No. 7(8)/2015-AEI(pt.)(11976)²

| Sl. No. | Parameter | Specifications |
|-----------------------------|--------------------------------|--|
| General Requirements | | |
| 1. | EVSE Type | Dual connector DC EVSE |
| 2. | Energy Transfer Mode | Conductive |
| 3. | Charging Mode | 4 |
| 4. | Reliability and Serviceability | Modularity, self-diagnostic features, fault codes and easy serviceability in the field |

| System Structure | | |
|-----------------------------------|------------------------------|--|
| 5. | Regulation Method | Regulated DC EV Charging station with combination of CVC or CCC but not simultaneously |
| 6. | Isolation | Each output isolated from each other with proper isolation |
| 7. | Environmental Conditions | Outdoor use |
| 8. | Power supply | DC EV Charging station connected to AC mains |
| 9. | DC output voltage rating | Up to and including 100V |
| 10. | Charge control communication | Communicate by digital and analog signals |
| 11. | Interface inter-operability | Inter-operable with any EV (non-dedicated, can be used by any consumer) |
| 12. | Operator | Operated by a trained person or EV Owner |
| Input Requirements | | |
| 13. | AC Supply System | Three-Phase, 5 Wire AC System (3Ph.+N+PE) |
| 14. | Nominal Input Voltage | 3-Phase, 415V (+6% and -10%) as per IS12360 |
| 15. | Input Frequency | 50Hz, +/-1.5Hz |
| 16. | Input Supply Failure Backup | Battery backup for minimum 1 hour for the control system and billing unit, to enable activities such as billing, to be provided. |
| Environmental Requirements | | |
| 17. | Ambient Temperature Range | 0 °C to +55 °C |
| 18. | Ambient Humidity | 5 to 95% |
| 19. | Ambient Pressure | 86kpa to 106kpa |
| 20. | Storage Temperature | 0 °C to +60 °C |

| Mechanical Requirements | | |
|--|--------------------------------|--|
| 21. | Mechanical Stability | Shall not be damaged by mechanical impact as defined in Section 11.11.2 of IEC 61851-1 |
| 22. | Mechanical Impact | Shall not be damaged by mechanical impact as defined in Section 11.11.3 of IEC 61851-1 |
| 23. | IP Rating | IP 54 |
| 24. | Cooling | Air cooled |
| 25. | Dimension (W*H*D)/Weight | To be decided e.g. W*H*D mm, xxx kg |
| Output Requirements | | |
| 26. | Number of outputs | 2 |
| 27. | Charger Configuration Types | <ul style="list-style-type: none"> • Type 1: Single vehicle charging 48V/60V/72V with a maximum of 10kW power, or a 2W vehicle charging at 48V with maximum power of 3.3kW. • Type 2: Single vehicle charging at 48V with a maximum 10kW power or 60V/72V with a maximum of 15kW power or a 2W vehicle charging at 48V with a maximum power of 3.3kW |
| 28. | Output Details | Suitable for 48V/60V/72V vehicle battery configuration |
| 29. | Output Current | 200A max |
| 30. | Output connectors | 2 output connectors |
| 31. | Output connector compatibility | One connector with GB/T 20234.2 +1 connector to be defined |
| 32. | Converter Efficiency | >92% at nominal output power |
| 33. | Power factor | >/= 0.90 (Full load) |
| User Interface & Display Requirements | | |

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|---|------------------------------|---|
| 34. | ON-OFF (Start-Stop) switches | Mandatory |
| 35. | Emergency stop switch | Simple Push Button Type (Red Colour), visible and easily accessible |
| 36. | Visual Indicators | Error indication, Presence of input supply indication, Charge process indication and other relevant information |
| 37. | Display Size | Minimum 3.5" inches with 720x480 pixels, user interface through touch screen/keypad |
| 38. | Support Language | English |
| 39. | Display Messages | <p>EVSE should display appropriate messages for user during the various charging states like</p> <ul style="list-style-type: none"> • Vehicle plugged in/ vehicle plugged out • Idle/ Charging in progress: SOC • Fault conditions • Metering Information: Consumption units • Duration since start of charge, time to charge, kWh |
| 40. | User Authentication | As per OCPP (Using mobile application or Card reader) |
| Cable Requirements | | |
| 41. | Charging cable length | 5 meter, straight cable |
| 42. | Cable Type | Charging cable and connector permanently attached to DC FC |
| Billing & Payment Requirements | | |
| 43. | Billing | Grid responsive metering |
| 44. | Payment | BHIM/ Bharat QR or UPI compliant mobile application payment |

| Communication Requirements | | |
|-----------------------------------|---|---|
| 45. | Communication between EVSE and vehicle | CAN based as per Annexure G of AIS 138-2 |
| 46. | Communication Interface between charger and central management system (CMS) | Ethernet (Standard)/Wi-Fi/2G/3G/4G |
| 47. | Communication between EVSE and central server | Open Charge Point Protocol (OCPP) 1.5 protocol or higher versions compatible to OCPP 1.5. Metering: Grid responsive metering |
| Performance Requirements | | |
| 48. | DC Output Voltage and current tolerance | DC Output current regulation in Constant Current Charging (CCC): +/- 2.5A for the requirement below 50A, and +/- 5% of the required value for 50A or more DC Output voltage regulation in Constant Voltage Charging (CVC): Max. 2% for the max rated voltage of the EVSE |
| 49. | Control delay of charging current in CCC | DC output current Demand Response Time: <1s Ramp up rate: 20A/s or more Ramp down rate: 100A/s or more |
| 50. | Descending rate of charging current | EVSE should be able to reduce DC current with the descending rate of 100A/s or more |
| 51. | Periodic and random deviation (current ripple) | DC output current ripple limit of EVSE: 1.5A below 10Hz 6A below 5kHz 9A below 150kHz |