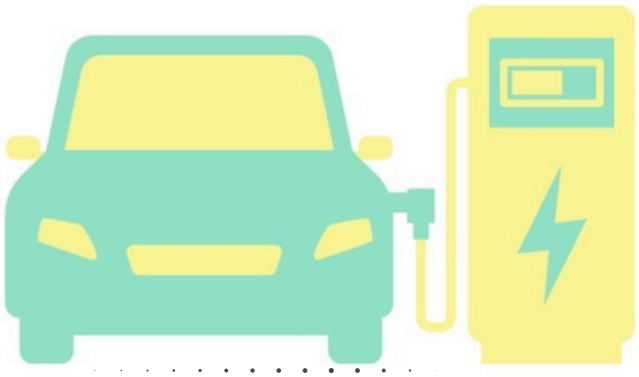
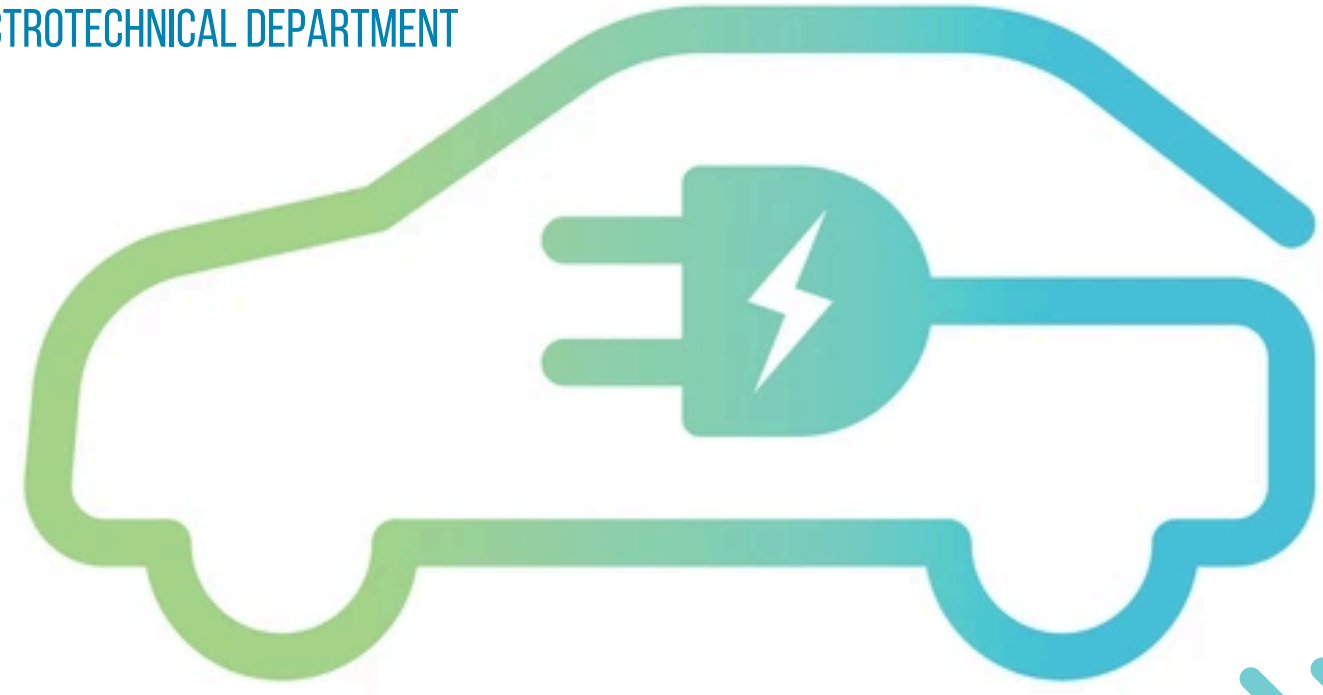
मानकः पथप्रदर्शकः



COMPENDIUM OF INDIAN STANDARDS ON

EV CHARGING INFRASTRUCTURE

PREPARED BY:
ELECTROTECHNICAL DEPARTMENT



BUREAU OF INDIAN STANDARDS
NEW DELHI

Table of Contents

INTRODUCTION

ELECTRIC VEHICLES (EVS) ARE PIVOTAL TO SUSTAINABLE MOBILITY, OFFERING SIGNIFICANT ENVIRONMENTAL BENEFITS BY REDUCING AIR POLLUTION AND GREENHOUSE GAS EMISSIONS, WHILE ALSO ENHANCING ENERGY EFFICIENCY AND NATIONAL ENERGY SECURITY.

ELECTROTECHNOLOGY IN MOBILITY SECTIONAL COMMITTEE, ETD 51 OF BIS FOCUSES ON DEVELOPING INDIAN STANDARDS FOR THE ELECTRIC VEHICLES (EVS) CHARGING INFRASTRUCTURE.

THIS COMPENDIUM PROVIDES A SUMMARY OF KEY INDIAN STANDARDS FORMULATED BY THE BUREAU OF INDIAN STANDARDS (BIS) RELATED TO ELECTRIC VEHICLE (EV) CHARGING INFRASTRUCTURE. THESE SUMMARIES ARE DESIGNED TO SIMPLIFY AND HIGHLIGHT THE CRITICAL ASPECTS OF EACH STANDARD RELEVANT TO EV CHARGING SYSTEMS.

THE COMPENDIUM IS INTENDED TO SERVE AS A QUICK REFERENCE TOOL FOR CHARGING STATION OPEARTORS, EV MANUFACTURERS, TESTING LABORATORIES, CERTIFICATION BODIES, REGULATORS, AND OTHER STAKEHOLDERS. IT AIMS TO SUPPORT EFFECTIVE IMPLEMENTATION, REGULATORY COMPLIANCE, INFRASTRUCTURE PLANNING, PRODUCT DEVELOPMENT, AND INFORMED DECISION-MAKING IN THE GROWING FIELD OF ELECTRIC MOBILITY.

Conductive Charging System

EVSE

IS 17017 (Part 1): 2018 : Electric Vehicle Conductive Charging System Part 1 General Requirements

This standard specifies the general requirements for electric vehicle (EV) supply equipment used for conductive charging of electric road vehicles, with rated supply voltages up to 1000 V AC or 1500 V DC. It applies to systems connected to public or private grids, as well as those powered by on-site storage like buffer batteries. The standard outlines the characteristics and operating conditions of EV supply equipment, the specifications for the connection between the charger and the vehicle, and the essential requirements for electrical safety, aiming to ensure reliable, safe, and standardized EV charging infrastructure in India.

IS 17017 : Part 23 : 2021 : Electric Vehicle Conductive Charging Systems Part 23 dc Electric Vehicle Supply Equipment

This standard focuses on DC electric vehicle supply equipment (EVSE), with rated supply up to 1000 V AC or 1500 V DC, and output up to 1500 V DC. It includes specifications for bi-directional power flow (e.g., V2G), supporting advanced DC charging infrastructure for high-capacity EVs.

IS 17017 : Part 25 : 2021 : Electric Vehicle Conductive Charging System - Part 25 D.C. EV Supply Equipment where Protection Relies on Electrical Separation

This standard defines requirements for DC EV supply equipment with electrical separation-based protection, suitable for low-voltage systems (up to 480 V AC or 600 V DC, with output not exceeding 120 V DC, 100 A). It also specifies the control and communication protocols between the EVSE and EV.

IS 17017 : Part 30 : 2025 : Electric Vehicle Conductive Charging Systems - Part 30 Dual Gun D.C. Electric Vehicle Supply Equipment.

This standard covers dual gun DC electric vehicle supply equipment, allowing simultaneous charging of two vehicles or higher power delivery. It supports rated supplies up to 1000 V AC or 1500 V DC, and outputs up to 1500 V DC, enhancing fast-charging capabilities for large EV fleets.

IS 17017: Part 31 : 2024 : Electric Vehicle Conductive Charging System Part 31 A.C or D.C E.V Supply Equipment for Where Protection Relies on Electrical Separation.

This standard defines AC or DC EV supply equipment relying on electrical separation for protection. It applies to systems up to 480 V AC or 600 V DC, with output not exceeding 240 V AC (32 A) or 120 V DC (100 A), supporting compact, safe charging options for low and medium voltage EV applications.

Connectors, Inlets, Socket-Outlets, Cable Assemblies

IS 17017 : Part 2 : Sec 1 : 2020: Electric Vehicle Conductive Charging System Part 2 Plugs, Socket-Outlets, Vehicle Connectors, and Vehicle Inlets Section 1 General requirements

This standard applies to accessories used in electric vehicle (EV) conductive charging systems, including plugs, socket-outlets, vehicle connectors, vehicle inlets, and cable assemblies. These components are designed for systems with control functions and are rated for operating voltages up to 690 V AC (50 Hz) at currents up to 250 A, and up to 1500 V DC at currents up to 200 A. The standard ensures the safe and reliable performance of these accessories, which are critical for efficient and standardized EV charging operations.

IS 17017: Part 2: Sec 2 : 2020 : Electric Vehicle Conductive Charging System - Part 2 Plugs, Socket- Outlets, Vehicle Connectors and Vehicle Inlets - Section 2 Dimensional compatibility and interchangeability requirements for A.C. pin and contact-tube accessories

This section specifies the dimensional compatibility and interchangeability requirements for A.C. plugs, socket-outlets, vehicle connectors, and inlets with standardized pin and contact-tube configurations. It applies to accessories with operating voltage not exceeding 415 V AC, 50 Hz, and current ratings up to 63 A (3-phase) or 70 A (single-phase), ensuring uniformity and safe interoperability in EV conductive charging systems.

IS 17017: Part 2 : Sec 3 : 2020 :Electric Vehicle Conductive Charging System Part 2 Plugs, Socket — Outlets, Vehicle Connectors and Vehicle Inlets Section 3 Dimensional compatibility and interchangeability requirements for D.C and A.C/D.C pin and contact-tube vehicle couplers

This section covers the dimensional compatibility and interchangeability requirements for DC and AC/DC vehicle couplers with standardized pin and contact-tube configurations. It is applicable for systems operating up to 1500 V DC or 1000 V AC, and current ratings up to 250 A, ensuring consistent design and safe operation of EV connectors across manufacturers.

IS 17017 : Part 2 : Sec 6 : 2021: Electric Vehicle Conductive Charging System -- Part 2 Plugs, Socket — Outlets, Vehicle Connectors and Vehicle Inlets -- Section 6 Dimensional compatibility requirements for D.C pin and contact — tube vehicle couplers intended to be used for D.C EV supply equipment where protection relies on electrical separation.

This section specifies the dimensional compatibility requirements for DC vehicle couplers where electrical separation is the primary protection method. It applies to systems rated up to 120 V DC and 100 A, ensuring compatibility, safety, and effective electrical isolation in low-voltage EV DC charging systems.

IS 17017 : Part 2 : Sec 7 : 2023 : Electric Vehicle Conductive Charging System - Part 2 Plugs, Socket-Outlets, Vehicle Connectors and Vehicle Inlets - Section 7 Dimensional Compatibility and Interchange Ability Requirements for A.C, D.C and

A.C/D.C Pin and Contact-Tube Vehicle Couplers intended to be used for A.C/D.C EV Supply Equipment where Protection Relies on Electrical Separation

This section provides requirements for A.C, D.C, and A.C/D.C vehicle couplers where electrical separation is the safety mechanism. It applies to systems with up to 120 V DC (100 A) and 240 V AC (32 A), aiming to standardize interfaces for safe and interchangeable use in compact EV charging applications.

IS 17017 : Part 22 : Sec 1 : 2021 : Electric Vehicle Conductive Charging Systems - Part 22 A.C. Charging Configurations - Section 1 A.C. charge point for light electric vehicle

This standard applies to Light Electric Vehicle (LEV) A.C. charge points, specifying their functional, environmental, energy measurement, and safety requirements. It supports basic conductive charging for LEVs with 240 V AC, 16 A supply, suitable for personal and light commercial use.

Electromagnetic Compatibility (EMC)

IS 17017 : Part 21 : Sec 1 : 2019 : Electric Vehicle Conductive Charging System Part 21 Electromagnetic Compatibility (EMC) Requirements Section 1 On-board chargers

This section specifies the electromagnetic compatibility (EMC) requirements for on-board chargers used in EVs, focusing on limiting electromagnetic interference to ensure reliable vehicle and grid operation without disturbing nearby electronics.

IS 17017 : Part 21 : Sec 2 : 2019 : Electric Vehicle Conductive Charging System Part 21 Electromagnetic Compatibility (EMC) Requirements Section 2 Off-board chargers

This part outlines the EMC requirements for off-board chargers, ensuring they operate within permissible electromagnetic disturbance limits and maintain compatibility with other electrical equipment and EV systems.

Battery Swapping System

IS 17896 (Part 1): 2022 Electric vehicle battery swap system - Part 1: General and Guidance

This standard provides a general overview and guidance for electric vehicle battery swap systems, used when the vehicle powertrain is off. It applies to swap systems using standard supply voltages (up to 1000 V AC or 1500 V DC) and supports EVs with one or more swappable battery systems (SBS), helping to standardize battery swapping infrastructure in India.

IS 17896 (Part 2): 2022 Electric vehicle battery swap system - Part 2: Safety requirements

This part specifies the safety requirements for EV battery swap systems, including protection against electric shock, EMC, signage, and communication security. It covers systems powered by grid or on-site storage (up to 1000 V AC or 1500 V DC) and applies to EVs using one or more SBS, ensuring safe and reliable operation of battery swapping stations.

Communication Protocols:

IS/ISO 15118-1 : 2013 : Road vehicles - Vehicle to grid communication interface: Part 1 general information and use - Case definition

This standard defines the general framework and use cases for the Vehicle-to-Grid (V2G) communication interface between electric vehicles (EVs) and the electric vehicle supply equipment (EVSE). It lays the foundation for bidirectional communication to support both charging and discharging operations, enabling features like smart charging, load balancing, billing, authentication, and energy trading. This part of the IS/ISO 15118 series provides the essential terminology, architecture, and system overview required for implementing advanced EV grid integration and supports future-proof solutions in smart grid ecosystems.

IS/ISO 15118-2 : 2014 Road vehicles - Vehicle - To - Grid communication interface: Part 2 network and application protocol requirements

This part specifies the network and application layer protocols required for the communication between an electric vehicle (EV) and the electric vehicle supply equipment (EVSE). It includes details on message structures, sequences, and data exchange necessary for smart charging, user authentication, billing, and energy management. The protocol enables seamless integration of EVs into the smart grid for both charging and potential energy feedback to the grid.

IS/ISO 15118-3 : 2015 Road vehicles - Vehicle to grid communication interface: Part 3 physical and data link layer requirements

This standard outlines the physical and data link layer specifications for wired communication between the EV and EVSE, particularly using Power Line Communication (PLC) technology. It defines parameters like modulation techniques, data rates, and signal quality, ensuring reliable, high-speed communication for V2G operations within the HomePlug Green PHY framework.

IS/ISO 15118-4 : 2018 Road vehicles - Vehicle to grid communication interface: Part 4 network and application protocol conformance test

This standard provides a set of conformance test cases and procedures to verify that the implementation of the network and application layer protocols (as defined in Part 2) complies with the IS/ISO 15118 standard. This helps manufacturers and system integrators validate the interoperability and reliability of their communication systems for EV charging and V2G functionalities.

IS/ISO 15118-5 : 2018 Road vehicles - Vehicle to grid communication interface: Part 5 physical layer and data link layer conformance test

This part specifies the conformance testing procedures for the physical and data link layers described in Part 3. It ensures that devices meet the required electrical and communication characteristics for PLC-based connectivity, helping ensure consistent performance and interoperability across EVs and charging stations.

IS/ISO 15118-8 : 2020 Road Vehicles - Vehicle to Grid Communication Interface Part 8: Physical Layer and Data Link Layer Requirements for Wireless Communication (First Revision)

This standard extends the V2G interface to wireless communication, defining the physical and data link layer requirements for wireless EV-EVSE interactions. It supports Wi-Fi-based communication, ensuring secure and efficient connectivity, especially in environments where wired charging interfaces are impractical or mobility is critical.

IS 17017 : Part 24 : 2021: Electric Vehicle Conductive Charging System Part 24 : Digital Communication between a DC Electric Vehicle Supply Equipment and an Electric Vehicle for control of DC Charging

This part sets the guidelines for digital communication between a DC EV supply equipment and the EV, enabling coordinated control and monitoring during the charging process, essential for safe, efficient, and automated DC fast charging.