SLOVENSKI STANDARD
oSIST prEN IEC 63382-1:2024

01-maj-2024

Upravljanje porazdeljenih sistemov za shranjevanje energije, ki temeljijo na vozilih z električnim napajanjem (ECV-DESS) - 1. del: Definicije, zahteve in primeri uporabe

Management of distributed energy storage systems based on electrically chargeable vehicles (ECV-DESS) - Part 1: Definitions, requirements and use cases

Ta slovenski standard je istoveten z: **prEN IEC 63382-1:2024**

ICS:

29.240.01	Omrežja za prenos in distribucijo električne energije na splošno	Power transmission and distribution networks in general
43.120	Električna cestna vozila	Electric road vehicles

oSIST prEN IEC 63382-1:2024 **en**

69/941/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: **IEC 63382-1 ED1**	
DATE OF CIRCULATION: **2024-03-15**	CLOSING DATE FOR VOTING: **2024-06-07**
SUPERSEDES DOCUMENTS: **69/872/CD, 69/937A/CC**	

IEC TC 69 : ELECTRICAL POWER/ENERGY TRANSFER SYSTEMS FOR ELECTRICALLY PROPELLED ROAD VEHICLES AND INDUSTRIAL TRUCKS

SECRETARIAT: Belgium	SECRETARY: Mr Peter Van den Bossche
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 8,TC 13,TC 57,TC 125	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.

FUNCTIONS CONCERNED:

☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY

☒ SUBMITTED FOR CENELEC PARALLEL VOTING	☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING

Attention IEC-CENELEC parallel voting

The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting.

The CENELEC members are invited to vote through the CENELEC online voting system.

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Recipients of this document are invited to submit, with their comments, notification of any relevant "In Some Countries" clauses to be included should this proposal proceed. Recipients are reminded that the CDV stage is the final stage for submitting ISC clauses. (SEE AC/22/2007 OR NEW GUIDANCE DOC).

TITLE:

Management of Distributed Energy Storage Systems based on Electrically Chargeable Vehicles (ECV-DESS) - Part 1: Definitions, Requirements and Use Cases

PROPOSED STABILITY DATE: 2026

NOTE FROM TC/SC OFFICERS:

CONTENTS

Figures

Tables

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

MANAGEMENT OF DISTRIBUTED ENERGY STORAGE SYSTEMS BASED ON ELECTRICALLY CHARGEABLE VEHICLE BATTERIES

Part 1: Use Cases & Architectures

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.

3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.

4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.

5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.

6) All users should ensure that they have the latest edition of this publication.

7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.

8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 63382 has been prepared by working group ~~subcommittee~~ JWG15: DISTRIBUTED ENERGY STORAGE SYSTEMS BASED ON ELECTRICALLY CHARGEABLE VEHICLES, of IEC technical committee TC69: ELECTRICAL POWER/ENERGY TRANSFER SYSTEMS FOR ELECRICALLY PROPELLED ROAD VEHICLES AND INDUSTRIAL TRUCKS. It is an International Standard.

The text of this International Standard [...International Standard, Technical Specification: specify document type...] is based on the following documents:

Draft	Report on voting
XX/XX/FDIS	XX/XX/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

An increasing number of DERs are being interconnected to electrical power systems while control and communication standards provide interoperable interfaces between DERs and other actors involved in the needed exchange of information. The growth of electric vehicle (EV) circulation, associated with the expansion of the charging infrastructure and the advent of Smart Charging (V1G) and Vehicle to Grid (V2G) technologies are creating a large number of DERs in the mobility sector.

Distributed Energy Storage Systems, based on Electrically Chargeable Vehicle batteries (ECV-DESS), can be created by aggregating several EVs connected to the charging infrastructure and acting as DERs. The ECV-DESS may provide grid services to improve the stable and reliable operation of the electrical power network. The Power Balancing will result from the coordinated efforts of conventional power systems in combination with the EV Charging infrastructure, the microgrids, the Virtual Power Plants, which will include DESS.

The specific nature of EV, which is a mobile DER, capable to connect to the charging infrastructure in different locations, with different charging modes, sets new requirements on communication interfaces. For instance, the EV Charging Stations may have different configurations and modes of operations. They can operate by AC or DC charge, they can charge and discharge, with mono or bidirectional power flow between EV and EVSE. They can be composed by one or more EVSEs in one EV-Charging Station. In presence of multiple EVSEs, they can be arranged in AC or DC bus configurations. Finally, the bidirectional inverter can be installed on-board of vehicle or off board.

Appropriate standards are essential to rule the complexity of these systems. These standards will sustain the growth of EV circulation, rule the V1G and V2X services, support the aggregation of multiple EV DERs, define how to specify the requirements between Aggregator/Flexibility Operator (FO) and EV Charging Station Operators. Presence on the market of products and services offered by several vendors calls for interoperability and interchangeability between solutions provided by different suppliers. Furthermore, the standards have to meet the requirements of cybersecurity, privacy and safety for the proper operation of ECV DESSs.

IEC 63382 is intended to cover all these aspects and to fills gaps in existing standards concerning communication between Aggregator/FO and EV Charging Station. It is aimed at completing the communication and control chain which connect the EV with the charging infrastructure (EVSE and Charging Stations) and with the Aggregator/FO at an upper hierarchical level. In this respect it represents a complement of the standardization work made on IEC/ISO 15118 and IEC 63110.

MANAGEMENT OF DISTRIBUTED ENERGY STORAGE SYSTEMS BASED ON ELECTRICALLY CHARGEABLE VEHICLE BATTERIES

Part 1: Use Cases & Architectures

1 Scope

IEC 63382 specifies the management of Distributed Energy Storage Systems, composed of Electrically Chargeable Vehicle batteries (ECV-DESS), which are managed by an Aggregator/Flexibility Operator (FO) and which are capable of performing Vehicle-to-V1G, V2G and V2X functions. This part 1 addresses the ECV-DESS use cases and architecture.

The Distribution System Operator (DSO) determines what distribution grid services are required or optional for distributed energy Resources (DER) to meet, and the Aggregator/FO establishes the technical and business requirements for the EVs to provide those grid services. These grid services can be provided by the Charging Station Operator (CSO) for the EVs connected in the charging station and/or by the individual EV User via their EV permissions and settings.

IEC 63382 describes the technical characteristics and requirements of ECV-DESS, including:

- EV charging stations configurations, comprised of several AC-EVSEs and/or DC-EVSEs.
- Individual EVs connected to grid via an EVSE and managed by an Aggregator/FO.

This document also describes the technical requirements of ECV-DESS, the Use Cases, the information exchange between the EV Charging Station Operator (CSO) and the Aggregator/FO, including both technical and business data, the communication protocols, and the conformance tests. It covers many aspects associated to the operation of ECV-DESS, including:

- Privacy issues consequent to GDPR application (General Data Protection Regulation).
- Cybersecurity issues.
- Grid Code requirements, as set in national guidelines, to include ancillary services, mandatory functions and remunerated services.
- Grid functions associated to V2G operation, including new services, as fast reserve for frequency regulation.
- Authentication/authorisation/transactions relative to charging sessions, including roaming, pricing and metering information.
- Management of energy transfers and reporting, including information interchange, related to power/energy exchange, contractual data, metering data.
- Demand Response, as smart charging (V1G).

It makes a distinction between mandatory functions and market driven services, taking into account the functions which are embedded in the FW control of DER smart inverters.

The 3 parts of IEC 63382 are each dedicated to a specific subject:

- Part 1 is dedicated to EV charging station configurations, communication architecture, requirements, both functional and non-functional, use cases, with actors, roles and domains descriptions. Reference is made to CENELEC's SGAM (Smart Grid Architecture Model) and to UML model.
- Part 2 is dedicated to communication protocol specifications. it includes layered model according to OSI model from ISO, list of requirements, data models, object model, messages and message formats, datatypes, message sequences, and security aspects.

- Part 3 is dedicated to Conformance testing. The conformance tests will cover the interface between Aggregator/FO and CSO. It includes Test setup, Test suite, Test cases designed to verify behaviour of system with respect to specifications and requirements.

The IEC 63382 standard is intended to be used by the many stakeholders of ECV-DESS: Aggregators/FO, e-mobility service providers, car makers, utilities, EV users, EV charging station operators and owners, manufacturers and maintainers of interfacing products, technology providers (HW, SW, certification testing), software developers and system engineers.

2 Normative references

IEC 63110	Protocol for management of electric vehicles charging and discharging infrastructures. Part 1: Basic definitions, Use cases and architectures.
ISO 15118 series,	Road vehicles – Vehicle to grid communication interface
IEC 61850-7-420	Communication networks and systems for power utility automation - Part 7-420: Basic communication structure - Distributed energy resources logical nodes
IEC TR 61850-90-8:2016	Communication networks and systems for power utility automation - Part 90-8: Object model for E-mobility
IEC SRD 63460:2023	Architecture and use-cases for EVs to provide grid support functions - Use Cases and Data Models for EVs Providing Grid Support Functions
EN 50549-1:2019	Requirements for generating plants to be connected in parallel with distribution networks - Part 1: Connection to a LV distribution network - Generating plants up to and including Type B
EN 50549-2:2019	Requirements for generating plants to be connected in parallel with distribution networks - Part 2: Connection to a MV distribution network - Generating plants up to and including Type B
EN 50491-12-1:2018	General requirements for Home and Building Electronic Systems (HBES) and Building Automation and Control Systems (BACS) – Smart grid – Application specification – Interface and framework for customer – Interface between the CEM and Home/Building Resource manager – General Requirements and Architecture
IEC 63119-1:2019	Information exchange for electric vehicle charging roaming service - Part 1: General.
IEC 62746-10-1:2018	Systems interface between customer energy management system and the power management system – Part 10-1: Open automated demand response
IEC DTS 62913-2-4/Ed1 2018	Generic Smart Grid requirement part 2-4 Electrical Transportation domain.
IEC 62559-2	Definition of the templates for use cases, actor list and requirements list.
IEC 61850-8-2	Communication networks and systems for power utility automation - Part 8-2: Specific communication service mapping (SCSM) - Mapping to Extensible Messaging Presence Protocol (XMPP)
IEC 62361-104	Power systems management and associated information exchange - Interoperability in the long term - Part 104: CIM Profiles to JSON schema Mapping. (proposed new work item)

IEC 62351	Cyber Security Series for the Smart Grid. Specifically:
IEC 62351-3	Power systems management and associated information exchange - Data and communications security - Part 3: Communication network and system security - Profiles including TCP/IP
IEC 62351-4	Power systems management and associated information exchange - Data and communications security - Part 4: Profiles including MMS and derivatives
IEC 62351-8	Power systems management and associated information exchange - Data and communications security – Part 8: Role-based access control for power system management
IEC 62351-9	Power systems management and associated information exchange - Data and communications security – Part 9 : Cyber security key management for power system equipment
IEC 62351-14	Power systems management and associated information exchange - Data and communications security - Part 14: Cyber security event logging
ISA/IEC 62443	series of standards for Automation and Control Systems Cybersecurity

3 Acronyms and definitions

3.1 Acronyms

Acronym	Definition
APP	Application (typically on a cell phone)
CEM	Customer energy manager
CS	Charging station
CSBE	Charging station backend
CSC	Charging station controller
CSMS	Charging service management system
CSO	Charging station operator
CSP	Charging service provider
DER	Distributed energy resources
DESS	Distributed energy storage systems
DSO	Distribution system operator
ECV	Electrically chargeable vehicle
EMS	Energy management system
EMSP	E-mobility service provider
EPS	Electric power system
ETP	Energy transfer plan
EV	Electric vehicle
EVCS	Electric vehicle charging stations
EVSE	Electric vehicle supply equipment
EVU	Electric vehicle user
FCSBE	Flexibility charging station backend
FMU	Frequency measurement unit

Acronym	Definition
FO	Flexibility operator
FPF	Forward power flow
GDPR	General data protection regulation
HV	High voltage
LCSMS	Local charging station management system
OBC	On-board charger
PCS	Power conversion system
RM	Resource manager
RPF	Reverse power flow
SGAM	Smart grid architecture model
TSO	Transmission system operator
V1G	Vehicle one-way to grid (charging only)
V2G	Vehicle two-way to grid (charging and discharging)
V2H	Vehicle to home
V2X	Vehicle to everything
VGI	Vehicle grid integration (includes V1G, V2G, V2H, V2X)

3.2 Definitions

3.2.1

AC charge

an EV charging mode carried out by EVSE supplying AC current to the EV, which is then converted into DC current by an On-Board Charger to be fed to the EV battery. It can also involve a bidirectional power flow, to allow EV battery discharging.

3.2.2

actor

entity that communicates and interacts.

Note 1 to entry: These actors can include people, software applications, systems, databases, and even the power system itself.

Note 2 to entry: In IEC SRD 62913 this term includes the concepts of Business Role and System Role involved in Use Cases.

[SOURCE: IEC 62559-2:2015, 3.2]

3.2.3

aggregator

party who contracts with a number of other network users (e.g. energy consumers) in order to combine the effect of smaller loads or distributed energy resources for actions such as demand response or for ancillary services

[SOURCE: IEV 617-02-18]

Note1: Aggregator and Flexibility Operator have the same meaning in the context of this standard

3.2.4

ancillary services

services necessary for the operation of an electric power system provided by the system operator and/or by power system users.

Note – System ancillary services may include the participation in frequency regulation, reactive power regulation, active power reservation, etc.