



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

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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

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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.

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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:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 1: Use Cases & Architectures

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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 ELECTRICALLY 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

213
214 Full information on the voting for its approval can be found in the report on voting indicated in
215 the above table.

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

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

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

- 224 • reconfirmed,
- 225 • withdrawn,
- 226 • replaced by a revised edition, or
- 227 • amended.

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INTRODUCTION

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

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

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

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

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

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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.

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

313
314 The IEC 63382 standard is intended to be used by the many stakeholders of ECV-DESS:
315 Aggregators/FO, e-mobility service providers, car makers, utilities, EV users, EV charging
316 station operators and owners, manufacturers and maintainers of interfacing products,
317 technology providers (HW, SW, certification testing), software developers and system
318 engineers.

319 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, IEC 61850-7-420	Road vehicles – Vehicle to grid communication interface 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
 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

320 **3 Acronyms and definitions**

321 **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)

322 3.2 Definitions

323 3.2.1

324 AC charge

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

328 3.2.2

329 actor

330 entity that communicates and interacts.

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

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

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

336 3.2.3

337 aggregator

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

341 [SOURCE: IEC 617-02-18]

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

343

344 3.2.4

345 ancillary services

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

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