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Low-voltage electrical installations -
Part 8-82: Functional aspects - Prosumer's low-voltage electrical installations

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Low-voltage electrical installations - Part 8-82: Functional aspects - Prosumer's low-voltage electrical installations

FOREWORD

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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 60364-8-82 edition 1.1 contains the first edition (2022-10) [documents 64/2559/FDIS and 64/2562/RVD] and its amendment 1 (2026-04) [documents 64/2815/FDIS and 64/2858/RVD].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

IEC 60364-8-82 has been prepared by IEC technical committee 64: Electrical installations and protection against electrical shock, IEC technical committee 8: System aspects of electrical energy supply and its subcommittee 8B: Decentralized electrical energy systems. It is an International Standard.

This first edition cancels and replaces IEC 60364-8-2 published in 2018. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC 60364-8-2:2018:

a) the vocabulary and concepts have been aligned as much as possible with those used by TC 8 and SC 8B, taking notably into account the IEC 62898 series and IEC TS 62786, still respecting the installers mindset (installers being the first users of the IEC 60364 series and being used to only refer to the IEC 60364 series);
b) the type of system earthing and the change of type of system earthing (sequencing) when there is a change of mode of the prosuming installation, have been clarified;
c) the conditions of connection and disconnection from the DSO network have also been described, both from the safety point of view and the proper functioning point of view;
d) additional requirements have been introduced;
e) the figures have been updated;
f) a new normative Annex D on single dwelling or similar application islandable PEIs has been added;
g) the numbering has also been reviewed to follow the updated numbering system of the IEC 60364 series, in line with the IEC Directives and compatible with Parts 7.

The text of this International Standard is based on the following documents:

Draft	Report on voting
64/2559/FDIS	64/2562/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/standardsdev/publications.

A list of all parts in the IEC 60364 series, published under the general title *Low-voltage electrical installations*, can be found on the IEC website.

The reader's attention is drawn to the fact that Annex E lists all of the "in-some-country" clauses on differing practices of a less permanent nature relating to the subject of this document.

The committee has decided that the contents of this document and its amendment 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, or
– revised.

INTRODUCTION

Historically, utilities were managing the public transmission and distribution network from the point of view of having a central production adapted to demand variation, a top-down energy flow, a production/consumption balance done by integrated utility companies and with rather passive users.

The following key factors are pushing the distribution network to change:

– the increasing number of electronic devices used daily and the growing needs as well as future needs (e.g. charging electric vehicles) will result in the structural growing of electricity consumption;

– the mediated pressure on climate change results in pressure on CO_2 emissions reduction;

– the electricity market is also quickly changing due mainly to its unbundling and deregulation, and to the greater number of intermittent renewable energy sources (global and local);

– users' expectations are also evolving as a result of an increasing need for better distribution networks reliability and quality, the search for better economic performance and the willingness to pro-actively manage their energy;

– technological evolution should also be considered as information and communication technology (ICT) is affordable and new energy storage solutions are emerging.

All stakeholders directly involved in the electricity generation, transmission, distribution and consumption have new expectations:

– customers are willing to reduce electrical energy costs in order to meet environment targets (renewable energy, energy efficiency) but also wish to benefit from the quality of electricity supply;

– suppliers wish to limit customer churn rate with price and service management;

– producers expect to maximize their yield of assets, to optimize their investments and to take profit from energy trading;

– the aggregator wants to create conditions suitable for new market emergence;

– the transmission system operator (TSO) aspires to a robust transmission network and to meet regulation objectives (price and level of services), while the distribution system operator (DSO) wants to meet regulation objectives (price and level of services), to reduce costs by productivity (including meter) and to have a flexible network;

– finally, governments and regulators are willing to create a competitive and sustainable energy market.

The objective of this document is to ensure that the low-voltage electrical installation is compatible with the current and future ways to deliver safely and functionally the electrical energy to current-using equipment wherever the electrical energy comes from the DSO or local generation. This document is not intended to influence all stakeholders of electricity supply on how the electrical energy should be sold and delivered.

INTRODUCTION to Amendment 1

The purpose of this amendment is to add a dedicated annex for PEIs with a DC system and distributed sources with isolated interlink converter.

82.1 Scope

This part of IEC 60364 provides requirements and recommendations that apply to low-voltage electrical installations connected or not to a distribution network able to operate:

– with local power supplies, and/or
– with local storage units,

and that monitors and controls the energy from the locally connected sources delivering it to:

– current-using equipment, and/or
– local storage units, and/or
– distribution networks.

Such electrical installations are designated as prosumer's electrical installations (PEIs).

These requirements and recommendations apply to new installations and modifications of existing installations.

This document also provides requirements and recommendations for the safe, efficient and correct behaviour of these installations when integrated into a smart grid.

NOTE Requirements for electrical sources for safety services are given in IEC 60364-5-56.

Information related to grid interaction to ensure the stability of the electrical system for grid connected PEIs is given in Annex B.

This document covers the requirements related to stability of islanded and stand-alone PEIs.

82.2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60038, *IEC standard voltages*

IEC 60364 (all parts), *Low-voltage electrical installations*

IEC 60364-4-41:2005, *Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock*
IEC 60364-4-41/AMD1:2017

IEC 60364-4-42:~~2010~~2024, *Low-voltage electrical installations – Part 4-42: Protection for safety – Protection against thermal effects*

IEC 60364-4-43:~~2008~~2023, *Low-voltage electrical installations – Part 4-43: Protection for safety – Protection against overcurrent*

IEC 60364-5-51:2005, *Electrical installations of buildings – Part 5-51: Selection and erection of electrical equipment – Common rules*

IEC 60364-5-53:2019, *Low-voltage electrical installations – Part 5-53: Selection and erection of electrical equipment – Devices for protection for safety, isolation, switching, control and*

monitoring
IEC 60364-5-53:2019/AMD1:2020

IEC 60364-5-54:2011, *Low-voltage electrical installations – Part 5-54: Selection and erection of electrical equipment – Earthing arrangements and protective conductors*

IEC 60364-5-55:2011, *Electrical installations of buildings – Part 5-55: Selection and erection of electrical equipment – Other equipment*
IEC 60364-5-55:2011/AMD1:2012
IEC 60364-5-55:2011/AMD2:2016

IEC 60364-5-57, *Low-voltage electrical installations – Part 5-57: Selection and erection of electrical equipment – Erection of stationary secondary batteries*

IEC 60364-6, *Low voltage electrical installations – Part 6: Verification*

IEC 60364-7-722*, Low-voltage electrical installations – Part 7-722: Requirements for special installations or locations – Supplies for electric vehicles*

IEC 60947-2:2016, *Low-voltage switchgear and controlgear – Part 2: Circuit-breakers*
IEC 60947-2:2016/AMD1:2019

IEC 61557-12:2018, *Electrical safety in low voltage distribution systems up to 1 000 V AC and 1 500 V DC – Equipment for testing, measuring or monitoring of protective measures – Part 12: Power metering and monitoring devices (PMD)*

IEC 62423, *Type F and type B residual current operated circuit-breakers with and without integral overcurrent protection for household and similar uses*

IEC TS 62749, *Assessment of power quality – Characteristics of electricity supplied by public networks*

IEC 60947-10, *Low-voltage switchgear and controlgear - Part 10: Semiconductor circuit-breakers*

IEC 62477-1:2022, *Safety requirements for power electronic converter systems and equipment - Part 1: General*

IEC TS 63053, *General requirements for residual current operated protective devices for DC system*

82.3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

82.3.0
smart grid
intelligent grid
electric power system that utilizes information exchange and control technologies, distributed computing and associated sensors and actuators, for purposes such as:

– to integrate the behaviour and actions of the network users and other stakeholders,
– to efficiently deliver sustainable, economic and secure electricity supplies

[SOURCE: IEC 60050-617:2011, 617-04-13]

82.3.0
distribution network
electric power network for the distribution of electric power from and to network users for which a distribution system operator (DSO) is responsible

[SOURCE: IEC TS 62786:2017, 3.4]

82.3.0
producer
<of electricity> entity or party generating electrical energy

[SOURCE: IEC 60050-617:2009, 617-02-01, modified – "entity or" has been added.]

82.3.0
consumer
<of electricity> entity or party which uses electricity

82.3.0
prosumer
<of electricity> entity or party which can be both a producer and a consumer of electrical energy

82.3.0
prosumer's electrical installation
PEI
low-voltage electrical installation connected or not to a distribution network able to operate:

– with local power supplies, and/or
– with local storage units,

that monitors and controls the energy from the connected sources delivering it to:

– current-using equipment, and/or
– local storage units, and/or
– distribution networks

82.3.0
electrical energy management system
EEMS
system monitoring, operating, controlling and managing energy resources and loads of the installation

Note 1 to entry: The EEMS can be a dedicated system or part of an integrated system, such as a home and building electronic system (HBES) or building management system (BMS or BACS) or other similar management system.

[SOURCE: IEC 60364-8-1:2019, 3.2.1, modified – Note 1 to entry has been added.]

82.3.0
operating mode
operation of an installation with respect to the different sources of electrical energy and to energy flow

82.3.0
direct feeding mode
operating mode in which the distribution network supplies the PEI

Note 1 to entry: Local storage units can supply current-using equipment or be charged by local power supplies and/or the distribution system.

82.3.0
reverse feeding mode
operating mode in which the PEI supplies the distribution network

Note 1 to entry: Local storage units can supply current-using equipment and/or the distribution system or be charged by local power supplies.

82.3.0
connected mode
operating mode in which the PEI is connected to the distribution network

EXAMPLE Direct feeding mode, reverse feeding mode or no feeding mode (i.e. without any energy exchange between the PEI and the distribution network).

82.3.0
island mode
operating mode in which the PEI is disconnected from the distribution network

Note 1 to entry: An island mode can be either the result of the action of automatic protections or the result of a deliberate action.

[SOURCE: IEC 60050-692:2017, 692-02-11, modified – The term "electric island" has been replaced with "island mode", the definition has been adapted to the PEI and Note 2 to entry has been deleted.]

82.3.0
grid connected PEI
PEI intended for operating only when connected to a distribution network

82.3.0
stand-alone PEI
PEI permanently not connected to a distribution network

Note 1 to entry: A stand-alone PEI is in a permanent island mode.

82.3.0
islandable PEI
PEI intended for operating either being connected to a distribution network or being disconnected from the distribution network

Note 1 to entry: An islandable PEI is in a connected mode or an intentionally island mode.

82.3.0
point of connection
POC
reference point where the prosumer's electrical installation is connected to the distribution network

Note 1 to entry: A PEI can have several points of connection for resilience.

Note 2 to entry: In IEC 60364 (all parts), the concept of origin of the installation is also used, origin of the installation meaning the point at which energy is delivered to the electrical installation. The POC is a specific origin of the installation, the one connected to the distribution network. Other origins of the installation can be the connection to the local power supply, to the storage system..

Note 3 to entry: Connection or disconnection of the prosumer electrical installation from the distribution network generally occurs at the POC.

[SOURCE: IEC 60050-617:2009, 617-04-01 modified – The definition has been adapted to the PEI and the notes to entry have been added.]

82.3.0
load shedding
method(s) of optimizing demand by controlling the electrical loads for variable periods of time

[SOURCE: IEC 60364-8-1:2019, 3.2.2]

82.3.0
system referencing conductor
conductor that connects one live conductor of the power system to an earthing arrangement

Note 1 to entry: The live conductor connected is the neutral or the mid-point if existing, or a line conductor when not existing.

82.3.0
electrical energy storage system
EES
installation able to absorb electrical energy, to store it for a certain duration and to release it

[SOURCE: IEC 62933-1:2018, 3.2, modified – The definition has been adapted to the PEI and the notes to entry have been deleted.]

82.3.20
interlink converter
ILC
power electronic converter system (PECS) interconnecting two circuits of an electrical installation that can have different voltages and frequencies allowing transfer of energy between these circuits

Note 1 to entry: An International Standard specifying safety and performance requirements for interlink converters is under development (IEC 63532).

Note 2 to entry: Different types of PECS can be defined depending on the nature of the installation – AC/DC or DC/DC or AC/AC, unidirectional or bidirectional – but without energy storage capability.

Note 3 to entry: Safety requirements for PECS are defined in the group safety publication IEC 62477-1.

82.3.21
isolated interlink converter
IILC
interlink converter (ILC) that provides at least a basic insulation between the two different circuits of an electrical installation and allows different types of electric system for these circuits

Note 1 to entry: See item 18 in Figure F.1, Figure F.2 and Figure F.3.

82.3.22
pre-charging
energizing the capacitances of a DC circuit with a limited current

82.3.23
intertripping
tripping of protective devices initiated from tripping of another protective device

82.4 Integration of PEI in its environment

82.4.1 Main objectives

Where a smart grid and an electrical installation interact a dynamic power demand/response concept should be implemented.

The smart grid has an impact on the electrical installations, thus:

– the consumer shall take into consideration the constraints of the electrical power system and can adapt its needs (e.g. through time) with the EEMS;

– the design and configuration of the installation may include load shedding and source selection by the EEMS.

As production of energy from the renewable sources such as PV or wind turbines is intermittent, a storage capacity may be installed within the PEI to ensure continuity of supply in all modes without being supplied by the grid, to support stability of the PEI and/or to maximize the self-consumption in connected mode.

82.4.2 Safety

The implementation of the requirements provided in this document shall not impair the safety of the PEI, as required by other parts of the IEC 60364 series. In case of change from any energy supply configuration (e.g. from distribution network supply to local power supplies) all protective measures shall continue to be operational or shall be automatically replaced by other standardized protective measures providing an equivalent level of safety.

82.4.3 Proper functioning

The power quality parameters are used to demonstrate reliable operation of the PEI and should not be outside the allowed operating range for all components in the PEI.

For a non stand-alone PEI, unless otherwise specified, the power quality levels at the point of connection (POC) shall be in the same range allowed in grid-connected and island mode.

When a PEI is connected to a distribution system, it shall not cause unacceptable disturbances to the other system users.

When operating in parallel with the distribution system the PEI shall not cause voltage fluctuation at the distribution system or result in flicker and rapid voltage changes outside the ranges defined in the IEC TS 62749.

NOTE See also IEC TS 60364-8-3:2020, Clause 11.

82.5 PEI concept

Any low-voltage PEI shall be considered as a set of electrical equipment having the following functions (see Figure 1):

– supply (e.g. connection to public power supply, local generator, photovoltaic systems, wind turbines, electrical energy storage system);

– distribution (e.g. distribution panel, wiring systems);

– consumption (e.g. motors, heating systems, lighting, lifts);

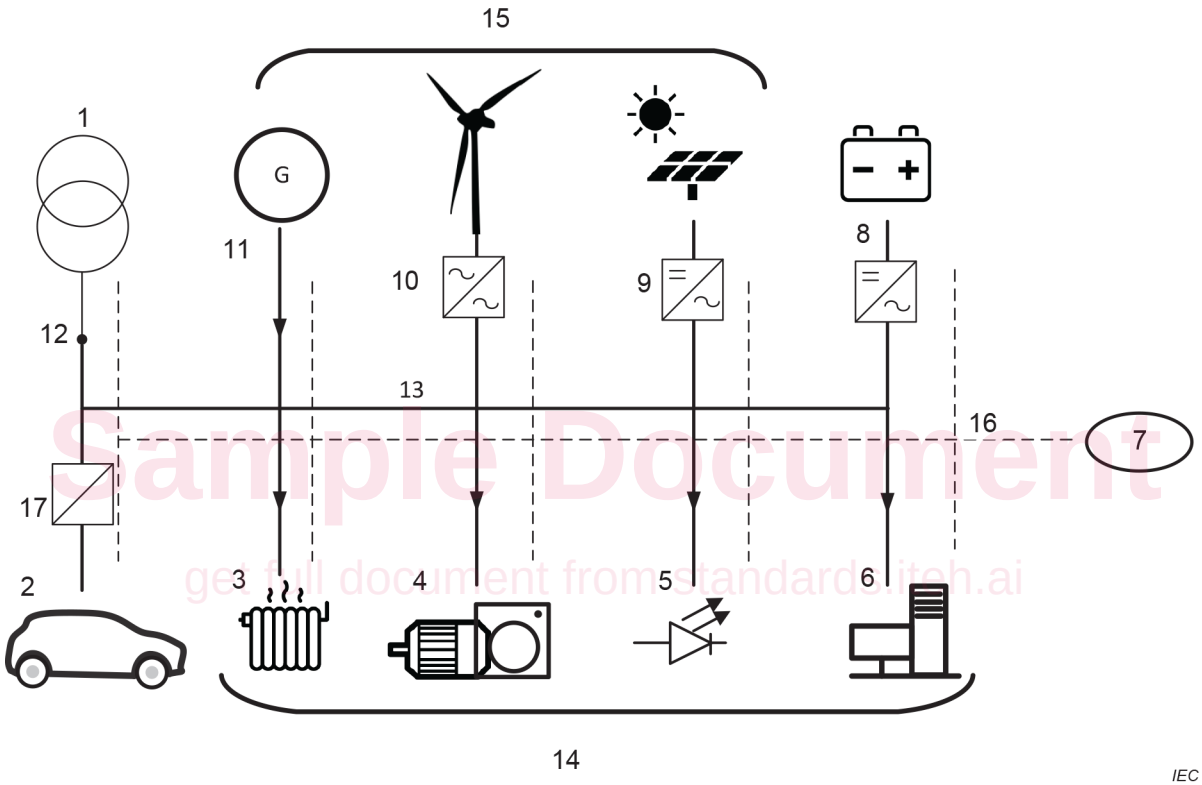
– energy management (e.g. load shedding equipment, monitoring device).

NOTE 1 An electrical energy storage system can be considered as a generator and as a load.

The electrical distribution within the PEI can be in alternating current (a.c), direct current (d.c), or a combination of both (see examples in Figure 1 and Figure 2), as every low voltage electrical installation covered by IEC 60364 (all parts).

The electrical installations shall consider both the requests from the DSO and the needs expressed by the prosumer. An EEMS shall be implemented to combine information and/or data, from/to the DSO, the availability of energy by the local sources and the prosumer's needs. The EEMS shall ensure the data security.

An uninterruptible power supply (UPS) shall not be considered as a prosumer when this UPS does not have a reverse feeding mode to supply energy to current-using equipment in the upstream part of the electrical installation and/or the distribution network, if any.



Key

1	Distribution network	10	Wind inverter
2	Electric vehicle	11	Other generator
3	Heaters	12	POC
4	Motors	13	Prosumer electrical installation
5	Lightings	14	Local consumption
6	Home appliances and electronic devices	15	Local generation
7	EEMS	16	Management signals (bidirectional exchanges)
8	Electrical energy storage system	17	EV charging station
9	Solar inverter		

Figure 1 – Example of prosumer's low-voltage electrical installation with AC electrical distribution within the PEI