# IEC TS 60364-8-3

Edition 1.0 2020-05

# TECHNICAL SPECIFICATION

colour inside

## Low-voltage electrical installations –
## Part 8-3: Functional aspects – Operation of prosumer's electrical installations

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 91.140.50

ISBN 978-2-8322-8303-5

**Warning! Make sure that you obtained this publication from an authorized distributor.**

® Registered trademark of the International Electrotechnical Commission

# CONTENTS

FOREWORD ..... 4
INTRODUCTION ..... 6
1 Scope ..... 7
2 Normative references ..... 7
3 Terms and definitions ..... 8
4 General ..... 9
4.1 PEI architecture ..... 9
4.2 Operating modes ..... 10
4.2.1 General ..... 10
4.2.2 Grid connected PEI ..... 10
4.2.3 Stand-alone PEI ..... 10
4.2.4 Islandable PEI ..... 11
5 Local power supplies ..... 11
5.1 General ..... 11
5.2 Renewable energy sources ..... 11
5.3 Electric vehicle charging system ..... 11
5.4 Electrical energy storage ..... 12
6 Power measurement ..... 12
7 Control ..... 13
7.1 General ..... 13
7.2 Grid connected PEI ..... 13
7.3 Stand-alone PEI ..... 13
7.4 Islandable PEI ..... 13
8 Monitoring ..... 14
9 Optimization ..... 14
10 Communication ..... 15
10.1 General requirements ..... 15
10.2 Information exchange within PEI ..... 15
10.3 Interaction between PEI and other systems ..... 16
10.3.1 General ..... 16
10.3.2 Specific functional constraints related to grid codes requirements ..... 16
10.3.3 Interaction with utilities or distribution system operator ..... 17
10.3.4 Interactions with revenue metering systems ..... 17
10.3.5 Interactions with energy-related service providers (including energy retailers) ..... 17
10.3.6 Peer to peer interactions with other prosumers or distributed energy resources ..... 17
11 Power quality ..... 18
11.1 General ..... 18
11.2 Voltage regulation ..... 18
11.3 Flicker ..... 18
11.4 Superimposed DC component ..... 18
11.5 Frequency ..... 18
11.6 Power factor ..... 18
12 Maintenance ..... 18
13 Test procedure ..... 19

13.1 General....19
13.2 Recommended tests....19
Annex A (informative) List of notes concerning certain countries....20
Bibliography....21

Figure 1 – PEI architecture: functional layers....9
Figure 2 – PEI architecture: example of physical layout....10

Table 1 – Examples of information exchange....16

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

# LOW-VOLTAGE ELECTRICAL INSTALLATIONS –

## Part 8-3: Functional aspects – Operation of prosumer's electrical installations

## 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) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

The main task of IEC technical committees is to prepare International Standards. In exceptional circumstances, a technical committee may propose the publication of a Technical Specification when

- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical Specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC TS 60364-8-3, which is a Technical Specification, has been prepared by IEC technical committee 64: Electrical installations and protection against electric shock.

The text of this Technical Specification is based on the following documents:

| Draft TS | Report on voting |
|---|---|
| 64/2400/DTS | 64/2427/RVDTS |

Full information on the voting for the approval of this Technical Specification can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

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 A 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 will remain unchanged until the stability date indicated on the IEC website under "http://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.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

# INTRODUCTION

There is a need for the development of new standards in smart grid that can apply to prosumers' electrical installations in low-voltage level. New standards relating to prosumers' low-voltage electrical installations that are different from existing facilities are needed in order to provide bidirectional power and information while being connected to upper smart grid systems, unlike other existing low-voltage electrical installations built in accordance with published standards, and in order to evaluate the power quality of electrical power supply.

The new standards should be able to verify the stability, interoperability, security which are characteristics of smart grid according to IEC TR 63097*,* published by IEC SyC Smart Energy. When a bidirectional power network is operating, it is very important to ensure the safety of homes and buildings and the protection of electrical installations in low-voltage against lightning and fault.

A new standard for the verification of the prosumer’s electrical installations should in the first instance define the power system of low-voltage and require criteria for information exchange between the prosumer’s electrical installations while connecting to other power systems.

This document is the first attempt in the development of a framework for low-voltage electrical installations. In order to match this overall framework, TC 64 made modifications to suit the needs of the prosumer’s electrical installations in low-voltage, based on the framework and architecture that have already been developed by IEC, IEEE and ETSI. Up till now, no attempt to match the frame of other systems such as utilities, service providers, to other prosumers' electrical installation systems has been made and this new development will help in setting-up prosumers' electrical installations effectively.

As low-voltage to a prosumer’s electrical installation is applied, the biggest change is the mode of the power supply. Direct feeding mode, reverse feeding mode and island mode are discussed in IEC 60364-8-2. The reliability of the system operation mode is important for the stability, safety, protection of the prosumer’s low-voltage electrical installations, depending on the mode of the power supply.

In order to transfer the power consumption, failure and accident information to other systems or other prosumers' electrical installations, it is important to ensure the interoperability of the systems. This document defines the model of exchange information to facilitate the exchange of data between systems, defines a framework to ensure interoperability, but does not define how to secure communications for interoperability as communication type and methods.

In this document, a method of power supply and a data exchange model based on the framework are suggested and the role of a prosumer who can directly produce and distribute energy is defined.

# LOW-VOLTAGE ELECTRICAL INSTALLATIONS –

# Part 8-3: Functional aspects – Operation of prosumer's electrical installations

## 1 Scope

This part of IEC 60364 specifies requirements and recommendations for the safe and proper functioning of prosumers' electrical installations.

It is intended for use by contractors, users, facility managers and similar of electrical low-voltage installations.

This document also provides requirements and recommendations on technical parameters and their limiting values influencing:

a) safety:
   - protection;
   - alarm;

b) proper functioning:
   - stability (voltage, frequency, etc);
   - reliability (power quality, interoperability of communication, etc);
   - energy management (power, power factor, current, stored energy, etc);
   - ability to ensure correct operation of equipment.

This document also provides requirements and recommendations on data exchange models, and test procedures for the prosumer's electrical installations that could include the following applications:

– local generating sources (e.g. photovoltaic systems, rotating generators, wind turbines);
– energy storage units (e.g. stationary secondary batteries);
– electric vehicle charging and/or discharging;
– prosumer's energy measurement unit (PEMU);
– control and monitoring system;
– loads which can be controlled.

This part of IEC 60364 is intended to be applied in conjunction with the other parts of IEC 60364.

## 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 60364-8-1, *Low-voltage electrical installation – Part 8-1: Functional aspects – Energy efficiency*

IEC 62053 (all parts), *Electricity metering equipment*

IEC TS 62786, *Distributed energy resources connection with the grid*