PD IEC TS 62898-1:2017+A1:2023

BSI Standards Publication

Microgrids

Part 1: Guidelines for microgrid projects planning and specification

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National foreword

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A list of organizations represented on this committee can be obtained on request to its committee manager.

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MICROGRIDS –

Part 1: Guidelines for microgrid projects planning and specification

FOREWORD

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- 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 62898, which is a Technical Specification, has been prepared by IEC technical committee 8: Systems aspects for electrical energy supply.

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

A list of all parts in the IEC 62898 series, published under the general title *Microgrids*, can be found on the IEC website.

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

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INTRODUCTION

Microgrids can serve different purposes depending on the primary objectives of their applications. They are usually seen as means to manage reliability of supply in a grid contingency and local optimization of energy supply by controlling distributed energy resources (DER). Microgrids also present a way to provide electricity supply in remote areas and to use clean and renewable energy as a systemic approach for rural electrification.

〈A1〉 This part of IEC 62898 defines the guidelines for the general planning and design of microgrids, IEC TS 62898-2 defines the general technical requirements for operation and control of microgrids, IEC TS 62898-3-1 defines the technical requirements for protection and dynamic control of microgrids, IEC TS 62898-3-2 defines the technical requirements for energy management systems of microgrids, IEC TS 62898-3-3 defines the technical requirements for self-regulation loads of microgrids, and IEC TS 62898-3-4 defines the technical requirements for microgrid monitoring and control systems. IEC TC8/SC8B/JWG1 is responsible for the development of these TS. 〈A1〉

This document mainly covers the following issues:

- determination of microgrid purpose and application;
- preliminary study used for microgrid planning, including resource analysis, load forecast, DER planning and microgrid power system planning;
- principles of microgrid technical requirements that should be specified during planning stage;
- microgrid evaluation to select an optimal planning scheme for a microgrid project.

IEC TS 62898-2 mainly covers the following issues:

- operation requirements and control targets of microgrids under different operation modes;
- basic control strategies and methods under different operation modes;
- requirements of energy storage, monitoring and communication under different operation modes;
- power quality.

Microgrids can be stand-alone or be a sub-system of the smart grid. The technical requirements in this document and in IEC TS 62898-2 are intended to be consistent and in line with:

- system requirements from IEC System Committee Smart Energy,
- technical requirements from IEC 62786 for connection of generators intended to be operated in parallel with the microgrid,
- basic rules from IEC TC 64 and TC 99 for safety and quality of power distribution (essentially selectivity, through coordination of protective devices) in installations,
- basic rules from IEC TC 77/SC 77A for electromagnetic compatibility (EMC) issues,
- IEC TS 62257 (all parts) with respect to rural electrification,
- IEC TS 62749 with respect to power quality.

Local laws and regulations can overrule the requirements of this document.

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MICROGRIDS –

Part 1: Guidelines for microgrid projects planning and specification

1 Scope

The purpose of this part of IEC 62898, which is a Technical Specification, is to provide guidelines for microgrid projects planning and specification. Microgrids considered in this document are alternating current (AC) electrical systems with loads and distributed energy resources (DER) at low or medium voltage level. This document does not cover direct current (DC) microgrids.

Microgrids are classified into isolated microgrids and non-isolated microgrids. Isolated microgrids have no electrical connection to a wider electric power system. Non-isolated microgrids can act as controllable units to the electric power system and can operate in the following two modes:

- grid-connected mode;
- island mode.

This document will cover the following areas:

- microgrid application, resource analysis, generation forecast, and load forecast;
- DER planning and microgrid power system planning;
- high level technical requirements for DER in microgrids, for microgrid connection to the distribution system, and for control, protection and communication systems;
- evaluation of microgrid projects.

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 61936 (all parts), *Power installations exceeding 1 kV AC*

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

3 Terms and definitions

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

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

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

3.1
black start
start-up of an electric power system from a blackout through internal energy resources

[SOURCE: IEC 60050-617:2009, 617-04-24]

3.2
busbar
low-impedance conductor to which several electric circuits can be connected at separate points

Note 1 to entry: In many cases, the busbar consists of a bar.

[SOURCE: IEC 60050-151:2001, 151-12-30]

3.3
converter
device for changing one or more characteristics associated with electric energy

Note 1 to entry: Characteristics associated with energy are for example voltage, number of phases and frequency including zero frequency.

[SOURCE: IEC 60050-151:2001, 151-13-36, modified – The words "electric energy" have been removed from the term]

3.4
combined heat and power
CHP
production of heat which is used for non-electrical purposes and also for the generation of electric energy

Note 1 to entry: Conventional power plants emit the heat produced as a useless byproduct of the generation of electric energy into the environment. With combined heat and power, the excess heat is captured for domestic or industrial heating purposes.

[SOURCE: IEC 60050-602:1983, 602-01-24, modified – The abbreviated term "CHP" has been added, as well as the note to entry. The definition has been rephrased]

3.5
earth
ground
〚A1〛part of the earth that is in electric contact with an earth electrode and that has an electric potential not necessarily equal to zero

[SOURCE: IEC 60050-195:2021, 195-01-03, modified – The adjective "local" has been removed from the term] 〈A1〛

3.6
earthing arrangement
grounding arrangement
〚A1〛all electrical means involved in the earthing of a system,installation or equipment

Note 1 to entry: Electric connection and devices used for earthing are examples of electrical means.

[SOURCE: IEC 60050-195:2021, 195-02-20] 〈A1〛

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3.7
earthing conductor
grounding conductor
〈A1〉 conductor forming a conductive path between a conductive part and an earth electrode

[SOURCE: IEC 60050-195:2021, 195-02-03] 〈A1〉

3.8
electromagnetic compatibility
EMC
ability of an equipment or system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment

〈A1〉 [SOURCE: IEC 60050-161:2018, 161-01-07] 〈A1〉

3.9
distributed energy resources
DER
〈A1〉 generators (with their auxiliaries, protection and connection equipment), including loads having a generating mode (such as electrical energy storage systems), connected to a low-voltage or a medium-voltage network

[SOURCE: IEC 60050-617:2017, 617-04-20] 〈A1〉

3.10
distributed generation
generation of electric energy by multiple sources which are connected to the power distribution system

[SOURCE: IEC 60050-617:2009, 617-04-09, modified – The other preferred terms "embedded generation" and "dispersed generation" have been deleted]

3.11
distribution network
electrical facility and its components including poles, transformers, disconnects, relays, isolators, and wires that are owned or operated by an electrical utility for the purpose of distributing electrical energy from substations to customers

Note 1 to entry: Usually, the distribution network operates up to a nominal voltage of 35 kV.

3.12
in-plant point of coupling
IPC
point on a network inside a system or an installation, electrically nearest to a particular load, at which other loads are, or could be, connected

Note 1 to entry: The IPC is usually the point for which electromagnetic compatibility is to be considered.

[SOURCE: IEC 61000-2-4:2002, 3.1.7]

3.13
interface switch
switch (circuit breaker, switch or contactor) installed in the microgrid, for separating the part(s) of the microgrid containing at least one generation unit from the distribution network

3.14
interruptible load
load of particular consumers which, according to contract, can be disconnected by the supply undertaking for a limited period of time

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[SOURCE: IEC 60050-603:1986, 603-04-41]

3.15
island
〈A1〉 part of an electric power system that is electrically disconnected from the remainder of the interconnected electric power system but remains energized from local electric power sources

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

Note 2 to entry: An electric island can be stable or unstable.

Note 3 to entry: Inside the electric island, generators and loads can be any combination of customer-owned and utility-owned.

[SOURCE: IEC 60050-692:2017, 692-02-11, modified – The term "electric" has been removed from the term., Note 3 to entry has been added.] 〈A1〉

3.16
isolated microgrid
〈A1〉 group of interconnected loads and distributed energy resources with defined electrical boundaries forming a local electric power system at distribution voltage levels, that cannot be connected to a wider electric power system

Note 1 to entry: Isolated microgrids are usually designed for geographical islands or for rural electrification.

Note 2 to entry: A microgrid capable of being connected to a wider electric power system is also called non-isolated microgrid or embedded microgrid.

[SOURCE: IEC 60050-617:2017, 617-04-23, modified – Note 2 to entry has been added.] 〈A1〉

3.17
low voltage
LV
a set of voltage levels used for the distribution of electricity and whose upper limit is generally accepted to be 1 000 V for alternating current

[SOURCE: IEC 60050-601:1985, 601-01-26]

3.18
load forecast
estimate of the expected load of a network at a given future date

[SOURCE: IEC 60050-603:1986, 603-01-04]

3.19
load profile
curve representing supplied electric power against time of occurrence to illustrate the variance in a load during a given time interval

[SOURCE: IEC 60050-617:2009, 617-04-05]

3.20
main switch
switch installed as close as possible to the point of connection, for protection against internal faults and disconnection of the microgrid from the distribution network

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