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TECHNICAL SPECIFICATION

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Distributed energy resources connection with the grid – Part 3: Additional requirements for stationary battery energy storage system

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INTERNATIONAL
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DISTRIBUTED ENERGY RESOURCES CONNECTION WITH THE GRID –

Part 3: Additional requirements for stationary battery energy storage system

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IEC TS 62786-3 has been prepared by IEC Technical Committee 8: System aspects of electrical energy supply. It is a Technical Specification.

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

Draft	Report on voting
8/1663/DTS	8/1680/RVDTS

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 Technical Specification 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.

A list of all parts in the IEC 62786 series, published under the general title *Distributed energy resources connection with the grid*, 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 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- withdrawn,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.

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DISTRIBUTED ENERGY RESOURCES CONNECTION WITH THE GRID –

Part 3: Additional requirements for stationary battery energy storage system

1 Scope

This part of IEC 62786, which is a Technical Specification, provides principles and technical requirements for interconnection of distributed Battery Energy Storage System (BESS) to the distribution network. It applies to the design, operation and testing of BESS interconnected to distribution networks. It includes the additional requirements for BESS, such as connection scheme, choice of switchgear, normal operating range, immunity to disturbance, active power response to frequency deviation, reactive power response to voltage variations and voltage changes, EMC and power quality, interface protection, connection and start to generate electric power, active power management, monitoring, control and communication, and grid-connected tests.

The stationary BESSs considered within the scope of this document include electrical forms such as lead-acid, lithium-ion, liquid flow and sodium-sulfur batteries, interconnected to medium voltage (MV) or low voltage (LV) distribution networks via bidirectional DC to AC power converters. This document will specify active and reactive power response and grid-connected testing for distributed BESS, as a supplement for IEC TS 62786-1:2023.

This document specifies interface requirements for connection of distributed BESS with the distribution network operating at a nominal frequency of 50 Hz or 60 Hz.

NOTE Mobile electrical energy storage devices (e.g., electrical vehicles) are under consideration for future editions.

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 TS 62786-1:2023, *Distributed energy resources connection with the grid – Part 1: General requirements*

IEC TS 62898-2: *Microgrids – Part 2: Guidelines for operation*

3 Terms and definitions, abbreviated terms and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC TS 62786-1:2023 and the following 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

3.1.1
battery energy storage system
BESS
electrical energy storage system with an accumulation subsystem based on batteries with secondary cells

Note 1 to entry: A battery energy storage system includes a flow battery energy system.

3.1.2
battery storage subsystem
BSS
BESS subsystem, comprising at least one battery energy storage unit, where energy is stored in the battery

Note 1 to entry: Generally, the battery storage subsystem is connected to the power conversion subsystem that performs the necessary power conversion to electrical energy; however, in some cases, a power converter can be embedded in the battery storage subsystem.

3.1.3
charging mode
operating mode during a required time in which the BESS is supplied with electrical energy from the POC in a controllable way

3.1.4
charging regulation time
time interval from the time when the BESS receives the control signal or when the grid parameter changes in a way to trigger the system response to the time when the power deviation is controlled within a specified percentage of the set point value after charging power firstly reaches to the set point value

3.1.5
charging response time
time interval from the time when the BESS receives the control signal or the grid parameter changes in a way to trigger the system response to the time when the charging power firstly reaches the set point value

3.1.6
charging to discharging transition time
under normal operation conditions, time when the BESS transits from a specified percentage of rated power charging mode to a specified percentage of rated power discharging mode

3.1.7
discharging mode
operating mode during a required time in which the BESS supplies electrical energy to the POC in a controllable way

3.1.8
discharging to charging transition time
under normal operation conditions, time when the BESS transits from a specified percentage of rated power discharging mode to a specified percentage of rated power charging mode

3.1.9
discharging regulation time
time interval from the time when the BESS receives the control signal or the grid parameter changes in a way to trigger the system response to the time when the power deviation is controlled within a specified percentage of the set point value after discharging power reaches to the set point value

3.1.10
discharging response time
time interval from the time when the BESS receives the control signal or the grid parameter changes in a way to trigger the system response to the time when the discharging power firstly reaches the set point value

3.1.11
interconnection interface
single device or a collection of multiple devices connecting the BESS with the grid, which includes the interface switchgear, interface control, interface protection, interface communication, auxiliary subsystem etc.

Note 1 to entry: Figure 1 gives an example of interconnection interface between BESS and distribution network.

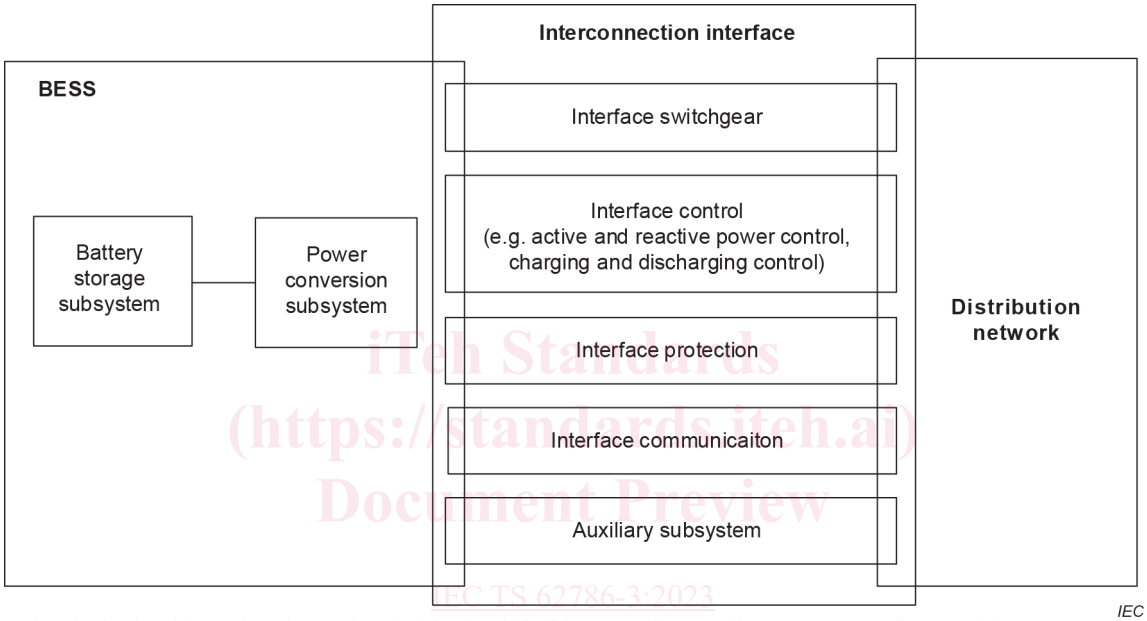

Figure 1 – Example of the interconnection interface concept

3.1.12
power conversion subsystem
subsystem generally connected to the battery storage subsystem and to the POC through the interconnection interface, which converts power bi-directionally between the battery storage subsystem and AC power system

[SOURCE: IEC 62933-1:2018, 5.2.2, modified − The definition has been rewritten and the Note to entry removed.]

3.1.13
rated power charging response time
special state of charging response time, which refers to the time interval from the time when the BESS receives the control signal in standby mode to the time when the charging power firstly reaches the rated power

3.1.14
rated power charging regulation time
special state of charging regulation time, which refers to the time interval from the time when the BESS receives the control signal in standby mode to the time when the power deviation is controlled within a specified percentage of the rated power after charging power firstly reaches the rated power