

INTERNATIONAL STANDARD



Flow battery energy systems for stationary applications –
Part 1: Terminology and general aspects
STANDARD PREVIEW
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IEC 62932-1:2020

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FLOW BATTERY ENERGY SYSTEMS FOR STATIONARY APPLICATIONS –**Part 1: Terminology and general aspects**

FOREWORD

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International Standard IEC 62932-1 has been prepared by IEC technical committee 21: Secondary cells and batteries, in collaboration with IEC technical committee 105: Fuel cell technologies.

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

FDIS	Report on voting
21/1027/FDIS	21/1037/RVD

Full information on the voting for the approval of this International Standard 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 62932 series, published under the general title *Flow battery energy systems for stationary applications*, 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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- withdrawn,
- replaced by a revised edition, or
- amended.

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FLOW BATTERY ENERGY SYSTEMS FOR STATIONARY APPLICATIONS –

Part 1: Terminology and general aspects

1 Scope

This part of IEC 62932 relates to flow battery energy systems (FBES) used in electrical energy storage (EES) applications and provides the main terminology and general aspects of this technology, including terms necessary for the definition of unit parameters, test methods, safety and environmental issues.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

3.1 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:

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

3.1.1

ambient temperature

environmental temperature around a flow battery energy system

3.1.2

auxiliary energy

energy consumed by all the auxiliary equipment and components of a flow battery and of a flow battery energy system

Note 1 to entry: The equipment and components include, but are not limited to, battery management system, battery support system, fluid circulation system.

3.1.3

battery management system

BMS

electronic system associated with a flow battery energy system which monitors and/or manages its state, calculates secondary data, reports that data and/or controls its environment to influence the flow battery energy system's performance and/or service life

Note 1 to entry: The function of the battery management system can be fully or partially assigned to the battery pack and/or to equipment that uses flow battery energy store systems.

[SOURCE: IEC 61427-2:2015, 3.8, modified – admitted terms "battery management unit" and "BMU" omitted, "battery" replaced by "flow battery energy system", Notes 2 to 4 deleted.]

3.1.4 battery support system BSS

auxiliary units, such as heat exchanger, ventilation system, safety system, and inert gas system, used in an FBES, and which are not stacks, or part of the fluid circulation system, power conversion system, or battery management system

Note 1 to entry: The battery support system is controlled by the battery management system.

3.1.5 charge charging

<of a battery> operation during which a secondary cell or battery is supplied with electric energy from an external circuit which results in chemical changes within the cell and thus the storage of energy as chemical energy

Note 1 to entry: A charge operation is defined by its maximum voltage, current, duration and other conditions as specified by the manufacturer.

[SOURCE: IEC 60050-482:2004, 482-05-27, modified – term "charging of a battery" separated into "charge" and "charging" with "of a battery" as the domain, and addition of the note.]

3.1.6 cold standby

standby state requiring warm up before a demand to operate can be met

Note 1 to entry: A cold standby state may apply to redundant or stand-alone items.

Note 2 to entry: In this context "warm up" includes meeting any conditions required to operate as required (e.g. achieving the required temperature, speed, pressure).

[SOURCE: IEC 60050-192:2015, 192-02-11, modified – "state" omitted from the term, and the domain, "of an item", deleted.]

3.1.7 discharge discharging

<of a battery> operation during which a secondary battery supplies electric energy to an external circuit which results in chemical changes within the cell and the release of energy as electrical energy

Note 1 to entry: A discharge operation is defined by its maximum voltage, current, duration and other conditions as specified by the manufacturer.

3.1.8 emergency shutdown

rapid regulated shutdown of the flow battery energy system triggered by a protection system or by manual intervention

[SOURCE: IEC 60050-415:1999, 415-01-11, modified – the word "regulated" added, and "wind turbine" replaced by "flow battery energy system".]

3.1.9 emergency stop

function which is intended to avert arising or reduce existing hazards to persons, damage to machinery or to work in progress and be initiated by a single action

[SOURCE: ISO 13850:2015, 3.1, modified – "(E-Stop)" omitted from the term, second preferred term "emergency stop function" omitted, layout modified.]

**3.1.10
energy efficiency**

useful energy output at primary POC divided by the required energy input by the FBES/FBS including all parasitic and auxiliary energy needed to run the system and evaluated during FBES/FBS operation with the same final state of charge as the initial state of charge

Note 1 to entry: The energy efficiency for FBES includes necessary conversion loss of power conversion system (PCS), auxiliary energy required for fluid circulation system, BMS and BSS.

Note 2 to entry: Efficiency is generally expressed in percentage.

[SOURCE: IEC 62933-1:2018, 4.12, modified – "EES" replaced by "FBES/FBS", Note 1 to entry replaced.]

**3.1.11
energy storage fluid**

fluid that contains active materials and flows through the battery cell, consisting of liquid, suspension or gas

**3.1.12
end of charge**

limit conditions specified by the manufacturer at which a charge is (to be) terminated

**3.1.13
end of discharge**

limit conditions specified by the manufacturer at which a discharge is (to be) terminated

**3.1.14
flow cell**

secondary cell characterized by the spatial separation of the electrodes and the movement of the energy storage fluids

Note 1 to entry: Flow battery cell includes the hybrid flow cell.

**3.1.15
flow battery energy system
FBES**

system to store energy consisting of FBS(s) and power conversion system(s)

**3.1.16
flow battery system
FBS**

two or more flow cells electrically connected including all components for use in an electrochemical energy storage system such as battery management system, battery support system and fluid circulation system

**3.1.17
fluid system**

components and equipment destined to store and circulate energy storage fluids, such as tanks, pipes, manual valves, electrical valves, pumps and sensors

**3.1.18
forced ventilation**

movement of air and its replacement with fresh air by mechanical means

[SOURCE: IEC 62282-3-300:2012, 3.9]

3.1.19**fully charged**

condition (status) where, after a charge process as specified by the manufacturer, the flow battery energy system reaches the end of charge point

3.1.20**fully discharged**

condition (status) where, after a discharge process as specified by the manufacturer, the flow battery energy system reaches the end of discharge point

3.1.21**gas release**

emission of gas from the flow battery energy system to the environment

3.1.22**grid-connected state**

condition in which the flow battery energy system is connected to the point of connection

3.1.23**ground fault**

occurrence of an accidental or an unplanned conductive path between a live conductor on the fluid system of the battery and the earth

Note 1 to entry: A conductive path can pass through faulty insulation, liquid films, structures (e.g. poles, scaffoldings, cranes, ladders), or vegetation (e.g. trees, bushes).

3.1.24**hot standby**

standby state providing for immediate operation upon demand

Note 1 to entry: A hot standby state may apply to redundant or stand-alone items.

Note 2 to entry: In some applications, an item in a hot standby state is considered to be operating.

[SOURCE: IEC 60050-192:2015, 192-02-12, modified – "state" omitted from the term, and the domain, "of an item", deleted.]

3.1.25**hybrid flow battery****hybrid flow cell**

flow battery or flow cell in which one of the active materials is, depending on the state of charge, a solid material deposited on one of the electrode surfaces

3.1.26**input power**

electrical power supplied to the FBES during charge and standby

3.1.27**insulation resistance**

resistance under specified conditions between two conductive elements separated by insulating materials

[SOURCE: IEC 60050-151:2001, 151-15-43]

3.1.28**interlock**

circuit linking mechanical, electrical or other devices, for example through auxiliary contacts, intended to make the operation of a piece of apparatus dependent on the condition or position of one or more others

[SOURCE: IEC 60050-811:2017, 811-25-13, modified – "circuit" omitted from the term.]

**3.1.29
fluid leakage**

unplanned escape of fluids from a cell or from an FBS

Note 1 to entry: Concentrating on leakage of energy storage fluids is incomplete as there is also leakage of fluid which is considered in the "safety" standard text.

**3.1.30
maximum ambient temperature**

highest ambient temperature at which the battery is operable and should perform according to specified requirements

**3.1.31
maximum discharge energy**

largest energy declared by the manufacturer that an FBS/FBES can provide under specified discharge operating conditions

Note 1 to entry: The maximum discharge energy is normally expressed in watt hour (Wh).

Note 2 to entry: The maximum discharge energy of an FBES is customarily measured at the point of connection (POC) to account for the auxiliary energy consumption.

**3.1.32
maximum input power**

highest level of power in watt that can be supplied to the FBES and at which it is operable and performs according to specified conditions

Note 1 to entry: This level is specified by the manufacturer.

**3.1.33
maximum output power**

highest level of power in watt that can be supplied by the FBES and at which it is operable and performs according to specified conditions

Note 1 to entry: This level is specified by the manufacturer.

**3.1.34
minimum ambient temperature**

lowest ambient temperature at which the battery is operable and should perform according to specified requirements

**3.1.35
natural ventilation**

movement of air and its replacement with fresh air due to the effects of wind and/or temperature gradients

[SOURCE: IEC 60050-426:2008, 426-03-07]

**3.1.36
negative terminal**

accessible conductive part provided for the connection of an external electric circuit to the negative electrode of the cell

[SOURCE: IEC 60050-482:2004, 482-02-24]

**3.1.37
non-operating state**

state of not performing any required function