

TECHNICAL SPECIFICATION

**Electrical energy storage (EES) systems –
Part 4-1: Guidance on environmental issues – General specification**

IEC TS 62933-4-1:2017
<https://standards.iteh.ai/catalog/standards/sist/93445c2a-d45b-4ad7-9042-17b4fbe71fff/iec-ts-62933-4-1-2017>



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IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

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IEC TS 62933-4:2017
17b4be71ff/iec-ts-62933-4-1-2017

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 13.020.30

ISBN 978-2-8322-4604-7

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General specification****FOREWORD**

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IEC TS 62933-4-1 which is a technical specification, has been prepared by IEC technical committee 120: Electrical Energy Storage (EES) Systems.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
120/93/DTS	120/98/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 62933 series, published under the general title *Electrical energy storage (EES) systems*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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INTRODUCTION

Electrical energy storage systems (EES systems) have been integrated into the grid systems. The EES systems play one of the key roles in grid operation. Integrating the EES systems with the grid systems may further bring benefits such as efficient utilization in renewable energy sources. A variety of electrical energy storage technologies have been used widely in small and large sizes, for residential, industrial and utility siting, and in renewable energy stabilization and other applications. An EES system is an integrated system with components that are well standardised, however, system aspects specific to EES systems have not been well discussed. Furthermore, environmental issues for product level have been discussed horizontally in other IEC documents; however, specific environmental aspects of systems have not been well discussed. Therefore, a standard method for assessing environmental issues in EES systems is indispensable.

Under these circumstances, this document describes, in accordance with ISO Guide 64:2008, principles and approaches for environmental issues of EES systems in both normal and abnormal operating conditions, and presents guidelines to address environmental impacts to and from EES systems, including the chronic impacts on humans.

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ELECTRICAL ENERGY STORAGE (EES) SYSTEMS –

Part 4-1: Guidance on environmental issues – General specification

1 Scope

This part of IEC 62933, which is a Technical Specification, describes environmental issues associated with electrical energy storage systems (EES systems), and presents guidelines to address the environmental impacts to and from EES systems including the impacts to humans due to chronic exposure associated with the mentioned environmental impacts.

It is the aim of this document to describe environmental issues that are uniquely and only applicable to EES systems. However, it is not the aim of this document to describe environmental issues that are applicable to any systems.

It is not the aim of this document to describe environmental issues associated with components and products used in EES systems.

This document applies to all EES systems regardless of the type of electrical energy storage technologies.

This document considers the issues in both normal and abnormal operating conditions.

2 Normative references

[IEC TS 62933-4-1:2017](#)

[ds.iteh.ai/catalog/standards/sist/93445c2a-d45b-4ad7-9042-17b4fbc71fff/iec-ts-62933-4-1-2017](#)

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 62933-1¹, *Electrical energy storage (EES) systems – Part 1: Terminology*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62933-1 and the following apply.

NOTE It has been considered useful to repeat some terms from exterior sources for convenience.

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/>

¹ Under preparation. Stage at the time of publication: IEC/CDV 62933-1:2017.

3.1**accumulation subsystem
storage subsystem**

EESS subsystem, comprising at least one EES, where the energy is stored in some form

Note 1 to entry: Mechanical energy, electrochemical energy, electromagnetic energy are frequent forms of stored energy.

Note 2 to entry: Generally (see Figure 1), the accumulation subsystem is connected to the power conversion subsystem that performs the necessary power conversion to electrical energy; however, in some cases, a power conversion is embedded in the accumulation subsystem (e.g. in electrochemical secondary cells the energy is directly available in electrical form).

3.2**auxiliary subsystem**

EESS subsystem containing equipment intended to perform particular functions additional to the storage/extraction of electrical energy which is done in the primary subsystem

Note 1 to entry: Generally (see Figure 1) the auxiliary subsystem is connected to the auxiliary POC through the auxiliary connection terminal.

Note 2 to entry: The equipment of the auxiliary subsystem (auxiliary equipment) is normally indispensable for setting up all the EESS operational states and assessing the correct performance (operation) of the primary and control subsystems during any operating mode.

Note 3 to entry: The auxiliary subsystem can be configured to take the energy from the primary subsystem (see Figure 1).

3.3**communication subsystem**

EESS subsystem containing an arrangement of hardware, software, and propagation media to allow the transfer of messages from one EESS component/subsystem to another one, including the data interface with external links

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[SOURCE: IEC TS 62443-1-1:2009, 3.2.25, modified – the original definition has been particularized for the EES system architecture.]

3.4**component**

constituent part of a device which cannot be physically divided into smaller parts without losing its particular function

[SOURCE: IEC 60050-151:2001, 151-11-21]

3.5**control subsystem**

EESS subsystem serving for monitoring and controlling the EESS, by including all equipment and functions for acquisition, processing, transmission, and display of the necessary process information

Note 1 to entry: Generally (see Figure 1) the control subsystem may be connected to the communication interface and comprises at least the management subsystem, communication subsystem and the protection subsystem.

Note 2 to entry: The control subsystem is normally fed by the auxiliary subsystem.

[SOURCE: IEC TS 62351-2:2008, 2.2.195, modified – the second part of the original definition has been particularized for the EES system architecture, and the first part of the original definition and notes to entry have been deleted.]

3.6

earth leakage current

current flowing from the live parts of the installation to earth, in the absence of an insulation fault

[SOURCE: IEC 60050-442:1998, 442-01-24]

3.7

electrical energy storage system

EES system

EES

grid-integrated installation with defined electrical boundaries, comprising at least one EES, whose purpose is to extract electrical energy from an electric power system, store this energy internally in some manner and inject electrical energy into an electrical power system and which includes civil engineering works, energy conversion equipment and related ancillary equipment

Note 1 to entry: The EES system is controlled and coordinated to provide services to the electric power system operators or to the electric power system users.

Note 2 to entry: In some cases, an EES system may require an additional energy source during its discharge, providing more energy to the electric power system than the energy it stored (electric power system is defined in IEC 60050-601:1985, 601-01-01).

3.8

environment

natural and man-made surroundings in which an EES system is installed, operates and interacts, including buildings and facilities, air, water, land, natural resources, flora, fauna (including human inhabitants) or those surroundings

[SOURCE: IEC 60050-904:2014, 904-01-01, modified – the original definition has been particularized for the EES system surroundings.]

3.9

environmental aspect

element of an EES system that can interact with the environment

[SOURCE: IEC 60050-904:2014, 904-01-02, modified – the original definition has been particularized for the EES system surroundings]

3.10

environmental impact

any change to the environment, whether adverse or beneficial, wholly or partly resulting from environmental aspects

[SOURCE: IEC 60050-904:2014, 904-01-03]

3.11

environmental issue

any environmental impact to and from EES systems including the impacts to humans during or after chronic exposure

3.12

life cycle

consecutive and interlinked stages of a product system, from raw material acquisition or generation of natural resources to final disposal

[SOURCE: IEC 60050-901:2013, 901-07-12]

3.13

life cycle thinking

consideration of all relevant environmental aspects (of a product) during the entire (product) life cycle

[SOURCE: ISO Guide 64:2008, 2.6]

3.14

malfunction

situation for which the electrical equipment does not perform the intended function due to a variety of reasons, including:

- variation of a property or of a dimension of the processed material or of the work piece;
- failure of one (or more) of its component parts or services;
- external disturbances (e.g. shocks, vibration, electromagnetic interference);
- design error or deficiency (e.g. software errors);
- disturbance of its power supply;
- surrounding conditions (e.g. condensation due to temperature change)

[SOURCE: IEC 60050-903:2013, 903-01-16]

3.15

management subsystem

EES subsystem providing the functionality needed for the safe, effective and efficient EES system operation

3.16

point of connection

POC

reference point on the electric power system where an EES system is connected

Note 1 to entry: An EES system may have several POCs arranged in two different classes: primary POC and auxiliary POC. From an auxiliary POC it is not possible to charge electrical energy, in order to store it internally and, finally, discharge it to the electric power system, but a primary POC can be used to feed the auxiliary subsystem and the control subsystem. In the absence of an auxiliary POC, the primary POC can be named simply as POC.

Note 2 to entry: The term "electric power system" is defined in IEC 60050-601: 1985, 601-01-01.

[SOURCE: IEC 60050-617:2009, 617-04-01, modified – the original definition has been particularized for the EES system and notes to entry have been added.]

3.17

primary subsystem

EES subsystem consisting of the components/subsystems that are directly responsible for storing electrical energy and extracting electrical energy

Note 1 to entry: Generally the primary subsystem is connected to the primary POC and comprises at least the accumulation subsystem and the power conversion subsystem (see Figure 1).

3.18

protection subsystem

EES subsystem containing an arrangement of one or more protection equipments, and other devices intended to perform one or more specified protection functions

Note 1 to entry: The protection subsystem includes one or more protection equipment, instrument transformer(s), transducers, wiring, tripping circuit(s), auxiliary supply(s). Depending upon the principle(s) of the protection subsystem, it may include one end or all ends of the protected section and, possibly, automatic reclosing equipment.