# SLOVENSKI STANDARD
# oSIST prEN IEC 62933-5-3:2023

**01-marec-2023**

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**Električne naprave za shranjevanje energije (EES) - 5-3. del: Varnostne zahteve pri izvajanju nenačrtovanih sprememb elektrokemičnih sistemov EES**

Electrical energy storage (EES) systems - Part 5-3: Safety requirements when performing unplanned modification of electrochemical based EES systems



**Ta slovenski standard je istoveten z:** **prEN IEC 62933-5-3:2023**

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**ICS:**

| | | |
|---|---|---|
| 27.010 | Prenos energije in toplote na splošno | Energy and heat transfer engineering in general |

**oSIST prEN IEC 62933-5-3:2023** **en**

# 120/301/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

| PROJECT NUMBER: | |
|---|---|
| **IEC 62933-5-3 ED1** | |
| DATE OF CIRCULATION: | CLOSING DATE FOR VOTING: |
| **2023-01-13** | **2023-04-07** |
| SUPERSEDES DOCUMENTS: | |
| **120/274/CD, 120/299/CC** | |

| IEC TC 120 : ELECTRICAL ENERGY STORAGE (EES) SYSTEMS | |
|---|---|
| SECRETARIAT:<br>Japan | SECRETARY:<br>Mr Hideki HAYASHI |
| OF INTEREST TO THE FOLLOWING COMMITTEES:<br>TC 8,TC 21,SC 21A,TC 22,TC 57,TC 69 | PROPOSED HORIZONTAL STANDARD:<br>☐<br>Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary. |
| FUNCTIONS CONCERNED:<br>☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☒ SAFETY | |
| ☒ SUBMITTED FOR CENELEC PARALLEL VOTING<br>**Attention IEC-CENELEC parallel voting**<br>The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting.<br>The CENELEC members are invited to vote through the CENELEC online voting system. | ☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING |



This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

**Electrical energy storage (EES) systems Part 5-3: Safety requirements when performing unplanned modification of electrochemical based EES systems**

PROPOSED STABILITY DATE: 2028

NOTE FROM TC/SC OFFICERS:

This CDV has reflected the observations of 120/299/CC.

And the standard title has been reviewed by WG5 experts below. In addition, there is a comment to review this title in CH01 (serial number 02) of 120/299/CC.

The reviewed title:

“Electrical energy storage (EES) systems Part 5-3: Safety requirements when performing unplanned modification of electrochemical based EES systems”

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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# ELECTRICAL ENERGY STORAGE (EES) SYSTEMS

## Part 5-3: Safety requirements when performing unplanned modification of electrochemical based EES systems

## FOREWORD

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International Standard IEC 62933-5-3 has been prepared by IEC technical committee 120: Electrical Energy Storage (EES) Systems.

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

| FDIS | Report on voting |
|---|---|
| 120/XX/FDIS | 120/XX/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.

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.

The National Committees are requested to note that for this document the stability date is 202X..

THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED AT THE PUBLICATION STAGE.

# INTRODUCTION

The initial design or planning cannot cover all modifications that are made to a BESS over its lifetime. Unplanned modifications require a careful evaluation of their potential impact on the safety of the BESS.

This document provides safety requirements, considerations and process steps when unplanned modifications of the BESS are to be carried out.

Such modification activities of the BESS require appropriate attention to safety issues in the relative redesign, installation, commissioning, operation and maintenance phases.

Unplanned modifications which are dealt with in this standard are:

– changes in energy storage capacity;
– changes of chemistries, design and manufacturer of the accumulation subsystem;
– changes of a subsystem component using non-OEM parts;
– changes to mode of operation;
– changes of installation site;
– changes in an accumulation subsystem due to an installation of reused or repurposed batteries.

# ELECTRICAL ENERGY STORAGE (EES) SYSTEMS

## Part 5-3: Safety requirements when performing unplanned modification of electrochemical based EES systems

## 1 Scope

This part of IEC 62933 applies to those instances when a BESS undergoes unplanned modifications. Such modifications can involve one or more of the following:

– changes of a subsystem component using non-OEM parts,

– changes to mode of operation,

– changes of installation site, or

– changes in an accumulation subsystem due to an installation of reused or repurposed batteries.

Any such modification shall not impair the original state of safety of the BESS.

This document complements IEC 62933-5-2, which relates to the overall safety aspects of a BESS. The requirements covered by this document are applied in addition to the requirements in IEC 62933-5-2 in accordance with each situation.

## 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 62933-1, *Electrical Energy Storage (EES) systems - Part 1: Vocabulary*

IEC TS 62933-5-1, *Electrical Energy Storage (EES) systems – Part 5-1: Safety considerations for grid integrated EES systems – General specifications*

IEC 62933-5-2, *Electrical Energy Storage (EES) systems – Part 5-2: Safety requirements for grid integrated EES systems – Electrochemical based system*

IEC 63330(future IEC), *Requirements for reuse of secondary batteries*

IEC 63338(future IEC), *General guidance for reuse of secondary cells and batteries*

## 3 Terms and definitions

**3.1**
**accumulation subsystem**
storage subsystem
EESS subsystem, comprising at least one electrical energy storage, 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, 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 the electrical form).

[SOURCE: IEC 62933-1: 2018, 2.27]

**3.2**
**battery energy storage system**
**BESS**

electrical energy storage system with accumulation subsystem based on batteries with secondary cells

Note 1 to entry: Battery energy storage systems can include a flow battery energy system (IEC 62932-1:2020, 3.1.15).

**3.3**
**battery operating range**
range of voltage, current and temperature to ensure the safe use of the accumulation subsystem

**3.4**
**critical stakeholder**
party concerned with the critical part of BESS safety affected by the modification

**3.5**
**unplanned modification**
modification that has not been intended to be carried out or planned prior to the start of operation of the BESS

Note 1 to entry: IEC 62933-5-2 7.13.1 “Operation and maintenance plan” deals with planned modification.

**3.6**
**OEM part**
part supplied to or by an original equipment manufacturer (OEM)

Note 1 to entry: OEM parts are generally used to manufacture new equipment and can also be purchased for maintenance and repair.

Note 2 to entry: A part that is not an OEM part is called “non-OEM part”.



**3.7**
**relocation**
moving an installation physically from its current location



**3.8**
**reused battery**
battery that is used again in the same application as it was used for when commissioned the first time

**3.9**
**repurposed battery**
battery that is used again in a different application as it used for when commissioned the first time

**3.10**
**residual usable period**
actual or estimated remaining length of service life

**3.11**
**safety margin, <of an EES system>**
margin defined within battery operating range considering system application, environmental conditions and so on for safe operation of BESS

**3.12**
**safe-operating range, <of an EES system>**
range excluding safety margin from battery operating range

**3.13**
state of energy**, <of an EES system>**
state of charge**, <of an EES system>**
EESS SOE
EESS SOC
ratio between the available energy from an EES system and the actual energy storage capacity
[SOURCE: IEC 62933-1:(future revision), 6.2.7]

**3.14**
state of health**, <of an EES system>**
EESS SOH
general condition of the EES system based on measurements that indicate its actual performance compared with its either nominal or rated performances

Note 1 to entry: The state of health includes also the temporary degradation due to faults inside the EESS subsystems.

[SOURCE: IEC 62933-1:(future revision), 6.2.8]

# 4 Guidelines for safety when performing unplanned modifications

## 4.1 General

The BESS, including the batteries, can be exposed to the following changes in safety conditions during its operation:

1) Changes in safety conditions due to changes in the surrounding environment,
2) Changes in safety conditions due to unplanned modifications of the BESS,
3) Changes in safety conditions due to aging, and
4) Changes in safety conditions due to modifications planned at the time of the initial design.

This standard describes the safety measures that shall be taken for BESS in the event of items 1) and 2) above. The events of items 3) and 4) should be considered and addressed at the time of initial design of the BESS, which is under the scope of IEC 62933-5-2.



NOTE: The modifications that occur in the BESS can be at the component, subsystem or system level. While the primary focus of this document is on changes in safety and their evaluation at the system level, the process can also require evaluation at the component or subsystem level (e.g., interactions between subsystems).



Figure 1 shows the modifications that affect safety, which are made by subdivision of changes in items 1) and 2). This standard deals with the modifications shown in the yellow boxes in Figure 1.



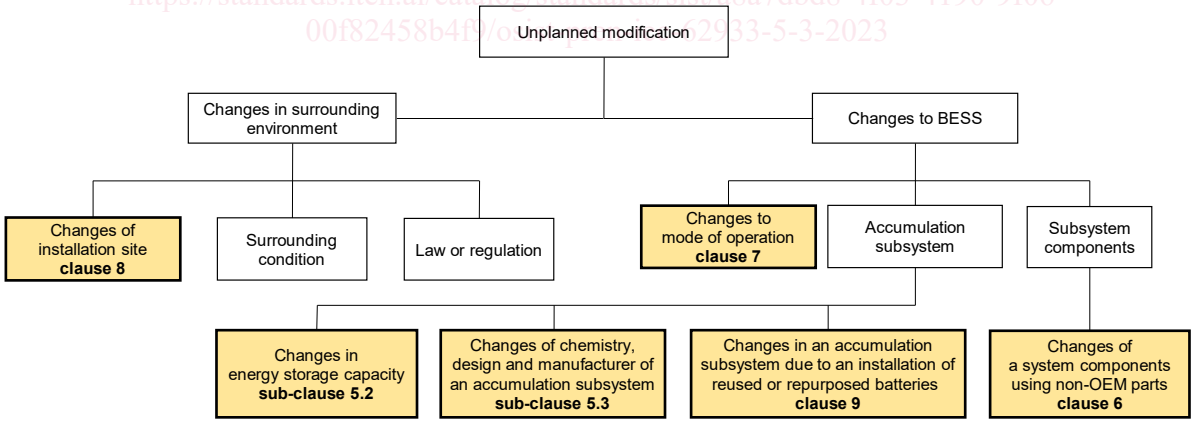


**Figure 1 – Major modifications and their classification**

An unplanned modification of a BESS can result in conditions where multiple safety related conditions are potentially affected at the same instance.

In such an event, the impact on safety of the individual modifications is to be assessed and all the resulting risk mitigation actions are to be implemented. The detailed requirements of assessment or measures etc., are described in each clause of this standard.

A wide range of stakeholders are involved in the modification process. Examples of stakeholders are shown in Table 1. The requirements described in this standard shall be met as appropriate in cooperation with the stakeholders.