



SLOVENSKI STANDARD
oSIST prEN IEC 62933-5-2:2024
01-maj-2024

Električne naprave za shranjevanje energije (EES) - 5-2. del: Varnostne zahteve za sisteme EES, integrirane v omrežje - Elektrokemični sistemi

Electrical energy storage (EES) systems - Part 5-2: Safety requirements for grid-integrated EES systems - Electrochemical-based systems

Elektrische Energiespeichersysteme (EES-Systeme) - Teil 5-2: Sicherheitsanforderungen an netzintegrierte EES-Systeme - Elektrochemische Systeme

Systèmes de stockage de l'énergie électrique (EES) - Partie 5-2: Exigences de sécurité pour les systèmes EES intégrés dans un réseau - Systèmes électrochimiques

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ICS:

27.010	Prenos energije in toplote na splošno	Energy and heat transfer engineering in general
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120/353/CDV

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IEC TC 120 : ELECTRICAL ENERGY STORAGE (EES) SYSTEMS	
SECRETARIAT: Japan	SECRETARY: Mr Masatake SAKUMA
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 8,TC 21,SC 21A,TC 22,SC 22E,TC 57,TC 64,TC 69,TC 82,TC 88,TC 105,CISPR	PROPOSED HORIZONTAL STANDARD: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> QUALITY ASSURANCE <input checked="" type="checkbox"/> SAFETY	
<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING Attention IEC-CENELEC parallel voting 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. The CENELEC members are invited to vote through the CENELEC online voting system.	<input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING

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TITLE:

Electrical energy storage (EES) systems - Part 5-2: Safety requirements for grid-integrated EES systems - Electrochemical-based systems

PROPOSED STABILITY DATE: 2029

NOTE FROM TC/SC OFFICERS:

This CDV reflects the observations made in 120/348/CC.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICAL ENERGY STORAGE (EES) SYSTEMS

Part 5-2: Safety requirements for grid-integrated EES systems – Electrochemical-based systems

FOREWORD

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International Standard IEC 62933-5-2 has been prepared by IEC technical committee 120: Electrical Energy Storage (EES) Systems.

This International Standard is to be used in conjunction with IEC 62933-5-1(Future):20xx.

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

FDIS	Report on voting
120/XX/FDIS	120/XX/RVD

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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 62933 series, published under the general title *Electrical energy storage (EES) systems*, can be found on the IEC website.

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

- 236 • reconfirmed,
- 237 • withdrawn,
- 238 • replaced by a revised edition, or
- 239 • amended.

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243

INTRODUCTION

244 All the electrical energy storage systems (EESS) follow the general safety requirements as
245 described in IEC 62933-5-1(Future), which is based on a system approach. IEC 62933-5-2
246 follows the same structure as IEC 62933-5-1(Future) and provides additional requirements for
247 battery energy storage systems (BESS). The additional requirements are provided for the
248 following reasons:

249 BESS can be integrated into a significant range of electrical grids.

250 The level of safety requirements awareness can vary between utilities, system integrators,
251 operators and end-users.

252 Although the safety of individual subsystems is generally covered by international standards at
253 ISO and IEC levels, the safety matters that arise due the combination of electrochemical
254 accumulation subsystems and any electrical subsystems are not always considered. BESS are
255 complex at the systems level due to the variety of potential battery options and configurations,
256 including the combination of subsystems (e.g. control systems for electrochemical accumulation
257 subsystems, electrochemical accumulation subsystems, power conversion subsystems and
258 auxiliary subsystems). Compliance with standards and related material produced specifically
259 for the safety of subsystems cannot be sufficient to reach an acceptable level of safety for the
260 overall system.

261 BESS can have additional safety hazards, due, for example, to the presence of chemicals, the
262 emission of toxic gases, chemicals spilt around the electrochemical accumulation subsystems
263 and to events critical for safety from electrochemical accumulation subsystems that cause
264 safety issues for the entire BESS. They can cause loss of power at any part of the systems and
265 buildings that can result in additional threats to safety. From a systems perspective, these
266 individual hazards can have a system wide impact.

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ELECTRICAL ENERGY STORAGE (EES) SYSTEMS

Part 5-2: Safety requirements for grid integrated EES systems – Electrochemical based systems

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1 Scope

276 This part of IEC 62933 primarily describes safety aspects for people and, where appropriate,
277 safety matters related to the surroundings and living beings for grid-connected energy storage
278 systems where an electrochemical storage subsystem is used.

279 This safety standard is applicable to the entire life cycle of BESS (from design to end of service
280 life management).

281 This document provides further safety provisions that arise due to the use of an electrochemical
282 storage subsystem (e.g. battery system) in EES systems that are beyond the general safety
283 considerations described in IEC 62933-5-1(Future).

284 This document specifies the safety requirements of an “electrochemical” energy storage system
285 as a "system" to reduce the risk of harm or damage caused by the hazards of an electrochemical
286 energy storage system due to interactions between the subsystems as presently understood.

2 Normative references

288 The following documents are referred to in the text in such a way that some or all of their content
289 constitute requirements of this document. For dated references, only the edition cited applies.
290 For undated references, the latest edition of the referenced document (including any
291 amendments) applies.

292 ISO/IEC 31010, Risk management — Risk assessment techniques

293 IEC 60068-2-52, *Environmental testing – Part 2-52: Tests – Test Kb: Salt mist, cyclic (sodium*
294 *chloride solution)*

295 IEC 60079-7:2015, *Explosive atmospheres – Part 7: Equipment protection by increased safety*
296 *"e"*
297 IEC 60079-7:2015/AMD1:2017

298 IEC 60079-13, *Explosive atmospheres – Part 13: Equipment protection by pressurized room "p"*
299 *and artificially ventilated room "v"*

300 IEC 60079-29 (all parts), *Explosive atmospheres – Gas detectors*

301 IEC 60364-4-44, *Low-voltage electrical installations – Part 4-44: Protection for safety –*
302 *Protection against voltage disturbances and electromagnetic disturbances*

303 IEC 60364-6:2016, *Low voltage electrical installations – Part 6: Verification*

304 IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

305 IEC 60664-1:2020, *Insulation coordination for equipment within low-voltage systems – Part 1:*
306 *Principles, requirements and tests*

307 IEC 60812, *Failure modes and effects analysis (FMEA and FMECA)*

308 IEC 61000-1-2, *Electromagnetic compatibility (EMC) – Part 1-2: General – Methodology for the*
309 *achievement of functional safety of electrical and electronic systems including equipment with*
310 *regard to electromagnetic phenomena*

- 311 IEC 61000-6-7, *Electromagnetic compatibility (EMC) – Part 6-7: Generic standards – Immunity*
 312 *requirements for equipment intended to perform functions in a safety-related system (functional*
 313 *safety) in industrial locations*
- 314 IEC 61025, *Fault tree analysis (FTA)*
- 315 IEC 61660-1, *Short-circuit currents in d.c. auxiliary installations in power plants and substations*
 316 *– Part 1: Calculation of short-circuit currents*
- 317 IEC 61660-2, *Short-circuit currents in d.c. auxiliary installations in power plants and substations*
 318 *– Part 2: Calculation of effects*
- 319 IEC 61882, *Hazard and operability studies (HAZOP studies) – Application guide*
- 320 IEC 61936-1:2010, *Power installations exceeding 1 kV a.c. – Part 1: Common rules*
 321 IEC 61936-1:2010/AMD1:2014
- 322 IEC 62305-2, *Protection against lightning – Part 2: Risk management*
- 323 IEC 62368-1, *Audio/video, information and communication technology equipment - Part 1:*
 324 *Safety requirements*
- 325 IEC 62477-1:2022, *Safety requirements for power electronic converter systems and equipment*
 326 *– Part 1: General*
- 327 IEC 62485-2, *Safety requirements for secondary batteries and battery installations – Part 2:*
 328 *Stationary batteries*
- 329 IEC 62619:2022, *Secondary cells and batteries containing alkaline or other non-acid*
 330 *electrolytes – Safety requirements for secondary lithium cells and batteries, for use in industrial*
 331 *applications*
- 332 IEC 62933-1, *Electrical energy storage (EES) systems – Part 1: Vocabulary*
- 333 IEC 62933-5-1: (Future), *Electrical Energy Storage (EES) systems – Part 5-1: Safety*
 334 *considerations for grid integrated EES systems – General specification*
- 335 IEC 62933-5-3, *Electrical energy storage (EES) systems Part 5-3: Safety requirements for*
 336 *electrochemical based EES systems considering initially non-anticipated modifications - partial*
 337 *replacement, changing application, relocation and loading reused battery -*
- 338 ISO/IEC Guide 51:2014, *Safety aspects – Guidelines for their inclusion in standards*

399 **3 Terms and definitions**

340 For the purposes of this document, the terms and definitions given in IEC 62933-1 and IEC
 341 62933-5-1(Future) and the following apply.

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

344 IEC Electropedia: available at <http://www.electropedia.org/>

345 ISO Online browsing platform: available at <http://www.iso.org/obp>

346 NOTE Where differences in definitions appearing in IEC 62933-1 and IEC 62933-5-1(Future) exist, the definition
 347 given in IEC 62933-1 prevail, unless otherwise specified here.

348 **3.1**

349 **type test**

350 conformity test made on one or more items representative of the production

351 [SOURCE: IEC 60050-151:2001, 151-16-16]

352 **3.2**

353 **routine test**

354 conformity test made on each individual item during or after manufacture

355 [SOURCE: IEC 60050-151:2001, 151-16-17]

356 **3.3**

357 **battery management system**

358 **BMS**

359 electronic system associated with a battery which has functions to controlling current in case of
360 overcharge, overcurrent, over discharge, and overheating and which monitors and/or manages
361 its state, calculates secondary data, reports that data and/or controls its environment to
362 influence the battery's safety, performance and/or service life

363 [SOURCE:IEC 62619:2022,3.12,]

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

366 **3.4**

367 **system integrator**

368 the manufacturer who integrates the individual subsystem and completes functions properly as
369 a single system.

370 **4 Basic guidelines for safety of BESS**

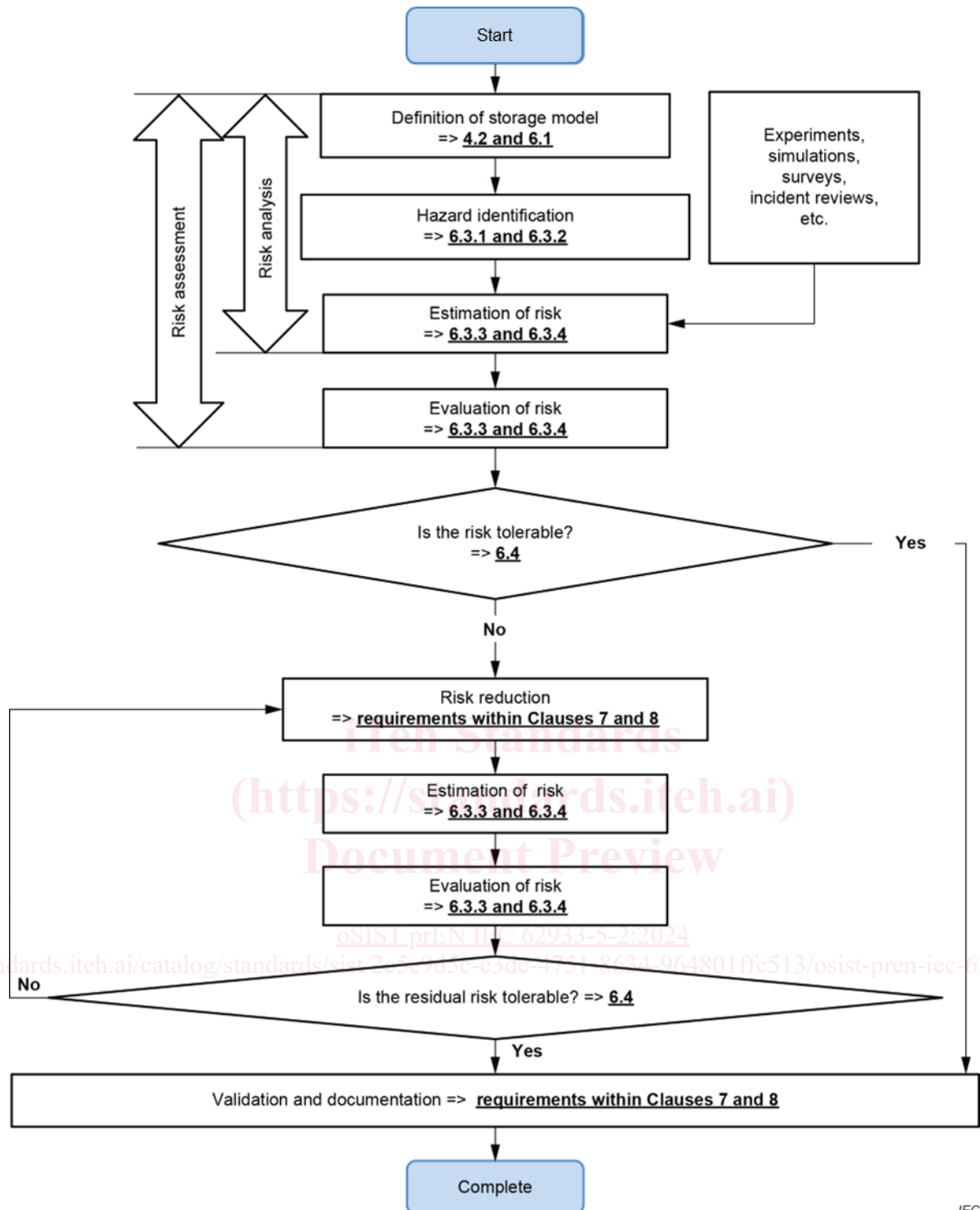
371 **4.1 General**

372 An assessment and reduction of risk associated with the BESS as manufactured and as
373 intended to be installed shall be conducted according to the sequence shown in Figure 1.

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374
375 **Figure 1 – General description for risk assessment and reduction of BESS**

376 Risks can depend on many factors including location, chemistry and the size/scale (e.g. power)
 377 of the BESS and need to be assessed accordingly. The location of BESS can range from single
 378 domestic situations, commercial and industrial applications to utility scale systems; and risks
 379 need to be assessed accordingly. Selection of chemistry for the electrochemical accumulation
 380 subsystem of the BESS can depend on the environment, performance characteristics and any
 381 associated costs and benefits.

382 As described in ISO/IEC Guide 51, risk reduction measures taken during design are “inherently
 383 safe design”, “guards and protective devices”, and “information for end users”. Additional
 384 measures at the use phase (life cycle safety management) are also described in ISO/IEC Guide
 385 51.