



SLOVENSKI STANDARD
oSIST prEN IEC 60086-1:2025
01-maj-2025

Primarne baterije - 1. del: Splošno

Primary batteries - Part 1: General

Primärbatterien - Teil 1: Allgemeines

Piles électriques - Partie 1: Généralités

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TITLE:

Primary batteries - Part 1: General

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157 INTERNATIONAL ELECTROTECHNICAL COMMISSION

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PRIMARY BATTERIES –**Part 1: General****FOREWORD**

- 165 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising
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196 International Standard IEC 60086-1 has been prepared by IEC technical committee 35: Primary
197 cells and batteries.

198 This fourteenth edition cancels and replaces the thirteenth edition published in 2021. This
199 edition constitutes a technical revision.

200 This edition includes the following significant technical changes with respect to the previous
201 edition:

- 202 a) In Clause 3, terms were reordered according their functions: basic terms, electrochemical
203 systems, battery shapes, electrical characteristics, specifications, failure modes;
- 204 b) New letter "T" was added in Table 1 Standardized electrochemical systems of 4.1.4
205 classification;
- 206 c) Maximum open circuit voltage of letter "F" was changed from 1,83 to 1,90 V;
- 207 d) Drawing of pulse tests with multiple load was moved from IEC 60086-2 to 5.2.2.2 application
208 tests with multiple loads;
- 209 e) Annex F: Guidance for proposing value of minimum average duration was modified;

- 210 f) Annex D of IEC 60086-2:2021, Common designation, has transferred to Annex H of this
211 document;
- 212 g) Table H.1, common designation index, was modified to provide reference to IEC 60086-2-1
213 and IEC 60086-2-2 for each battery;
- 214 h) Annex I identifies the batteries of general use and the applicable tests to compare their
215 performance, in support of Regulation (EU) 2023/1542 (Batteries Regulation).

216

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

FDIS	Report on voting
35/XXXX/CD	35/XXXX/XX

218

219 Full information on the voting for the approval of this International Standard can be found in the
220 report on voting indicated in the above table.

221 The language used for the development of this International Standard is English.

222 This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in
223 accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available
224 at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are
225 described in greater detail at www.iec.ch/standardsdev/publications.

226 A list of all parts in the IEC 60086 series, under the general title *Primary batteries*, can be found
227 on the IEC website. (<https://standards.iteh.ai>)

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

- 231 • reconfirmed,
- 232 • withdrawn,
- 233 • replaced by a revised edition, or
- 234 • amended.

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237

INTRODUCTION

238 The technical content of this part of IEC 60086 provides fundamental requirements and
239 information on primary cells and batteries. In this sense, IEC 60086-1 is the main component
240 of the IEC 60086 series and forms the basis for the subsequent parts. For example, this part
241 includes elementary information on definitions, nomenclature, dimensions and marking. While
242 specific requirements are included, the content of this part tends to explain methodology (how)
243 and justification (why).

244 Over the years, this part has been changed to improve its content and remains under continual
245 scrutiny to ensure that the publication is kept up to date with the advances in both battery and
246 battery-powered device technologies.

247 Safety requirements and recommendations are available in IEC 60086-4, IEC 60086-5 and
248 IEC 62281. Specifications are available in IEC 60086-2-1, IEC 60086-2-2 and IEC 60086-3.
249 Environmental aspects are dealt with in IEC 60086-6.

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PRIMARY BATTERIES –

Part 1: General

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1 Scope

259 This part of IEC 60086 is intended to standardize primary batteries with respect to dimensions,
260 nomenclature, terminal configurations, markings, test methods, typical performance, safety and
261 environmental aspects.

262 This document on one side specifies requirements for primary cells and batteries. On the other
263 side, this document also specifies procedures of how requirements for these batteries are to be
264 standardised.

265 As a classification tool for primary batteries, this document specifies system letters, electrodes,
266 electrolytes, and nominal as well as maximum open circuit voltage of electrochemical systems.

267 The object of this part of IEC 60086 is to benefit primary battery users, device designers and
268 battery manufacturers by ensuring that batteries from different manufacturers are
269 interchangeable according to standard form, fit and function. Furthermore, to ensure
270 compliance with the above, this part specifies standard test methods for testing primary cells
271 and batteries.

272 This document also contains requirements in Annex A justifying the inclusion or the ongoing
273 retention of batteries in the IEC 60086 series.

2 Normative references

275 The following documents are referred to in the text in such a way that some or all of their content
276 constitutes requirements of this document. For dated references, only the edition cited applies.
277 For undated references, the latest edition of the referenced document (including any
278 amendments) applies.

279 IEC 60086-2-1, *Primary batteries – Part 2-1: Physical and electrical specifications of batteries*
280 *with aqueous electrolyte*

281 IEC 60086-2-2, *Primary batteries – Part 2-2: Physical and electrical specifications of lithium*
282 *batteries*

283 IEC 60086-3, *Primary batteries – Part 3: Watch batteries*

284 IEC 60086-4, *Primary batteries – Part 4: Safety of lithium batteries*

285 IEC 60086-5, *Primary batteries – Part 5: Safety of batteries with aqueous electrolyte*

3 Terms and definitions

287 For the purposes of this document, the following terms and definitions apply.

288 ISO and IEC maintain terminological databases for use in standardization at the following
289 addresses:

- 290 • IEC Electropedia: available at <https://www.electropedia.org>
- 291 • ISO Online browsing platform: available at <https://www.iso.org/obp>

292 **3.1**
293 **cell**

294 basic functional unit, consisting of an assembly of electrodes, electrolyte, container, terminals
295 and usually separators, that is a source of electric energy obtained by direct conversion of
296 chemical energy

297 [SOURCE:IEC 60050-482:2004, 482-01-01]

298 **3.2**
299 **battery**

300 one or more cells electrically connected and fitted in a case, with terminals, markings and
301 protective devices etc., as necessary for use

302 [SOURCE:IEC 60050-482:2004, 482-01-04, modified – removal of "fitted with devices
303 necessary for use.]

304 **3.3**
305 **primary cell**
306 **primary battery**

307 cell or battery that is not designed to be electrically recharged

308 **3.4**
309 **round cell**
310 **round battery**

311 cell or battery with circular cross section

312 **3.5**
313 **button cell**
314 **button battery**

315 small round cell or battery where the overall height is less than the diameter, containing
316 aqueous electrolyte

317 Note 1 to entry: See coin cell, coin battery, lithium button cell, lithium button battery.

318 [SOURCE: IEC 60050-482:2004 482-02-40]

319 **3.6**
320 **coin cell**
321 **coin battery**
322 **lithium button cell**
323 **lithium button battery**

324 small round cell or battery where the overall height is less than the diameter, containing non-
325 aqueous electrolyte

326 Note 1 to entry: The nominal voltage of lithium batteries is typically greater than 2 V.

327 Note 2 to entry: See button cell, button battery.

328 **3.7**
329 **cylindrical cell**
330 **cylindrical battery**

331 round cell or battery in which the overall height is equal to or greater than the diameter

332 [SOURCE:IEC 60050-482:2004, 482-02-39, modified – "cell with a cylindrical shape" replaced
333 with "round cell or battery"]

334 **3.8**
335 **nominal voltage**
336 U_n
337 suitable approximate value of the voltage used to designate or identify a cell, a battery or an
338 electrochemical system

339 [SOURCE:IEC 60050-482:2004, 482-03-31, modified – addition of U_n .]

340 **3.9**
341 **open-circuit voltage**
342 **OCV**
343 voltage across the terminals of a cell or battery when it is off discharge

344 **3.10**
345 **closed-circuit voltage**
346 **CCV**
347 voltage across the terminals of a battery when it is on discharge

348 [SOURCE:IEC 60050-482:2004, 482-03-28, modified – "voltage between the terminals of a cell
349 or battery" replaced by "voltage across the terminals of a battery".]

350 **3.11**
351 **end-point voltage**
352 **EV**
353 specified voltage of a battery at which the battery discharge is terminated

354 [SOURCE:IEC 60050-482:2004, 482-03-30]

355 **3.12**
356 **minimum average duration**
357 **MAD**
358 minimum average time on discharge which is met by a sample of batteries

359 Note 1 to entry: The discharge test is carried out according to the specified methods or standards and designed to
360 show conformity with the standard applicable to the battery types.

361 **3.13**
362 **application test**
363 simulation of the actual use of a battery in a specific application

364 **3.14**
365 **discharge**
366 operation during which a battery delivers current to an external circuit

367 **3.15**
368 **service output**
369 service life, or capacity, or energy output of a battery under specified conditions of discharge

370 **3.16**
371 **service output test**
372 test designed to measure the service output of a battery

373 Note 1 to entry: A service output test may be prescribed, for example, when

374 a) an application test is too complex to replicate;

375 b) the duration of an application test would make it impractical for routine testing purposes.

376 **3.17**
377 **storage life**
378 duration under specified conditions at the end of which a battery retains its ability to perform a
379 specified service output

380 [SOURCE:IEC 60050-482:2004, 482-03-47, modified – "function" replaced by "service output".]

381 **3.18**
382 **terminal**
383 conductive parts of a battery providing connection to an external circuit

384 [SOURCE:IEC 60050-482:2004, 482-02-22, modified – “conductive part of a device, electric
385 circuit or electric network, provided” replaced by to “conductive parts of a battery providing” and
386 “device, electric circuit or electric network to one or more external conductor” replaced by “an
387 external circuit”.]

388 **3.19**
389 **leakage**
390 unplanned escape of electrolyte, gas or other material from a cell or battery

391 Note 1 to entry: Leakage in this sense should not be confused with the test evaluation criteria for leakage specified
392 in Clause 4 and Clause 5 of this document.

393 [SOURCE:IEC 60050-482:2004, 482-02-32]

394 **4 Requirements**

395 **4.1 General**

396 **4.1.1 Design**

397 Primary batteries are sold mainly in consumer markets. In recent years, they have become more
398 sophisticated in both chemistry and construction, for example both capacity and rate capability
399 have increased to meet the growing demands from new, battery-powered equipment technology.

400 When designing primary batteries, the aforementioned considerations shall be taken into
401 account. Specifically, their dimensional conformity and stability, their physical and electrical
402 performance and their safe operation under normal use and foreseeable misuse conditions shall
403 be assured.

404 Additional information on equipment design can be found in Annex B.

405 **4.1.2 Battery dimensions**

406 The dimensions for individual types of batteries are given in IEC 60086-2-1, IEC 60086-2-2 and
407 IEC 60086-3.

408 **4.1.3 Terminals**

409 **4.1.3.1 General**

410 Terminals shall be in accordance with Clause 8 of IEC 60086-2-1 and IEC 60086-2-2.

411 Their physical shape shall be designed in such a way that they ensure that the batteries make
412 and maintain good electrical contact at all times.

413 They shall be made of materials that provide good electrical conductivity and resistance to
414 corrosion.