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Niskonapetostne naprave za zaščito pred prenapetostnimi udari - 1. del: Splošne zahteve in preskusne metode

Low-voltage surge protective devices - Part 01: General requirements and test methods

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29.240.10	Transformatorske postaje. Prenapetostni odvodniki	Substations. Surge arresters

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37A/401/CDV

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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:

Low-voltage surge protective devices - Part 01: General Requirements and test methods

PROPOSED STABILITY DATE: 2026

NOTE FROM TC/SC OFFICERS:

Annex F, Annex G and Annex I from 37A/366/CD were decided to be shifted to future IEC TR 61643-03, which should be distributed as a DTR in parallel to this CDV.

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231 INTERNATIONAL ELECTROTECHNICAL COMMISSION

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LOW-VOLTAGE SURGE PROTECTIVE DEVICES –

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236

Part 01: General requirements and test methods

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FOREWORD

241 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising
242 all national electrotechnical committees (IEC National Committees). The object of IEC is to promote
243 international co-operation on all questions concerning standardization in the electrical and electronic fields. To
244 this end and in addition to other activities, IEC publishes International Standards, Technical Specifications,
245 Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC
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271 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is
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273 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of
274 patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

275 International Standard IEC 61643-01 has been prepared by subcommittee SC37A Low-
276 voltage surge protective devices, of IEC technical committee 37: Surge arresters.

277 This standard together with the second edition of IEC 61643-11 cancels and replaces the first
278 edition of IEC 61643-11, published in 2011-03-09. It contains the common requirements for all
279 SPDs. The specific requirements for SPDs for AC applications are contained in the second
280 edition of IEC 61643-11. This edition constitutes a technical revision.

281 This edition includes the following significant technical changes with respect to the first
282 edition of IEC 61643-11:

283 a) Clarification on test application either to a complete SPD, to a “mode of protection”, or to
284 a complete “SPD assembly”

285 b) Additional measurement of voltage protection level on “combined modes of protection”
286 between live conductors and PE (see new Annex F)

- 287 c) Additional duty test for T1 SPD and T2 SPD with follow current to check for increased
288 follow current at lower impulse current amplitude (see 9.3.5.5)
- 289 d) Modified and amended short circuit current test requirements to better cover up-to-date
290 internal SPD disconnecter technologies (see 9.3.6.3)
- 291 e) Improved dielectric test requirements for the SPD's main circuits and added dielectric test
292 requirements for "electrically separated circuits" (see 9.3.7 and 9.3.8)
- 293 f) Additional clearance requirements for "electrically separated circuits" (see 9.4.4)
- 294 g) Additional information and details for SPDs for DC installations

295 The text of this standard is based on the following documents:

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

296 Full information on the voting for the approval of this standard can be found in the report on
297 voting indicated in the above table.

298 This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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

- 302 • reconfirmed,
- 303 • withdrawn,
- 304 • replaced by a revised edition, or
- 305 • amended.

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306

INTRODUCTION

307 It has been assumed in the drafting of this International Standard that the execution of its
308 provisions is entrusted to appropriately qualified and experienced persons.

309 This standard is a product family standard dealing with the safety and performance of Surge
310 Protective Devices (SPDs) and takes precedence over horizontal and generic standards
311 covering the same subject.

312 This part 01 of the IEC 61643 series addresses the general safety and performance tests for
313 SPDs.

314 NOTE: Throughout this publication, when "Part 01" is mentioned, it refers to IEC 61643-01.

315 This standard recognizes the internationally accepted level of protection against hazards such
316 as electrical, mechanical, thermal, fire and radiation of SPDs when operated as in normal use
317 taking into account the manufacturer's instructions. It also covers abnormal situations that can
318 be expected in practice.

319 This standard takes into account the requirements of IEC 60364 as far as possible so that
320 there is compatibility with the wiring rules when the SPD is connected to the supply mains.
321 However, national wiring rules may differ.

322 If the intended applications of an SPD are covered by different parts of the IEC 61643-X1
323 series of standards, all relevant parts are applied, as far as is reasonable.

324 This standard is only to be applied together with the latest edition of one or more of the
325 subsequent parts of the IEC 61643-X1 series of standards.

326 SPDs containing additional features or functions not addressed in this standard and the
327 relevant subsequent part(s) may require additional consideration and tests to ensure the main
328 SPD function is not adversely affected and no hazards may arise from these additional
329 features or functions. If appropriate standards exist to cover such functions they should be
330 applied.

331 There are three SPD Types for SPDs intended to be installed in power systems:

332 T1 SPDs are subjected to impulses simulating conducted partial lightning currents.

333 T2 SPDs and T3 SPDs are subjected to impulses of shorter duration.

334

LOW-VOLTAGE SURGE PROTECTIVE DEVICES –

Part 01: General requirements and test methods

1. Scope

This part 01 of the IEC 61643 series is applicable to devices for surge protection against indirect and direct effects of lightning or other transient overvoltages, hereafter referred to as Surge Protective Devices (SPDs).

SPDs are intended to be connected to circuits or equipment rated up to 1 000 V AC (RMS) or 1 500 V DC. Performance and safety requirements, tests and ratings are specified in this standard. SPDs contain at least one nonlinear component and are intended to limit surge voltages and divert surge currents.

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 60060-1:2010, *High-voltage test techniques - Part 1: General definitions and test requirements*

IEC 60068-2-11:1981, *Environmental testing – Part 2-11: Tests – Test Ka: Salt mist*

IEC 60068-2-14:2009, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60068-2-30, 2005, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60068-2-78:2012, *Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state*

IEC 60099-4:2014, *Surge arresters - Part 4: Metal-oxide surge arresters without gaps for a.c. systems*

IEC 60112, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC 60269 series, *Low-voltage fuses*

IEC 60269-1:2014 ed 4.2, *Low-voltage fuses - Part 1: General requirements*

IEC 60269-2:2016 ed 5.1, *Low-voltage fuses - Part 2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application) – Examples of standardized systems of fuses A to K*

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

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

- 373 IEC 60695-2-11:2021, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods –*
374 *Glow-wire flammability test method for end-products (GWEPT)*
- 375 IEC 60695-10-2:2014, *Fire hazard testing - Part 10-2: Abnormal heat - Ball pressure test*
376 *method*
- 377 IEC 60898 series, *Electrical accessories – Circuit-breakers for overcurrent protection for*
378 *household and similar installations*
- 379 IEC 60898-1:2019 ed 2.1, *Electrical accessories – Circuit-breakers for overcurrent protection*
380 *for household and similar installations - Part 1: Circuit-breakers for AC operation*
- 381 IEC 60898-3:2022 ed 1.1, *Electrical accessories – Circuit-breakers for overcurrent protection*
382 *for household and similar installations - Part 3: Circuit-breakers for DC operation*
- 383 IEC 60947-2:2019 ed 5.1, *Low-voltage switchgear and controlgear – Part 2: Circuit-breakers*
- 384 IEC 61000 (all parts), *Electromagnetic compatibility (EMC)*
- 385 IEC 61180, *High-voltage test techniques for low-voltage equipment - Definitions, test and*
386 *procedure requirements, test equipment*
- 387 IEC 61210:2010, *Connecting devices – Flat quick-connect terminations for electrical copper*
388 *conductors*
- 389 IEC 62475:2010, *High-current test techniques – Definitions and requirements for test currents*
390 *and measuring systems*
- 391

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392 **3. Terms, definitions and abbreviated terms**

393 **3.1 General**

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

395 ISO and IEC maintain terminological database for use in standardization at the following
396 addresses:

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

399 **3.2 Terms and definitions**

400 **3.2.1**

401 **1,2/50 voltage impulse**

402 voltage impulse with a nominal virtual front time of 1,2 μs and a nominal time to half-value of
403 50 μs

404 Note 1 to entry: IEC 60060-1 provides the voltage impulse definitions of front time, time to half-value and
405 waveshape.

406 **3.2.2**

407 **8/20 current impulse**

408 current impulse with a nominal virtual front time of 8 μs and a nominal time to half-value of
409 20 μs

410 Note 1 to entry: IEC 62475 provides the current impulse definitions of front time, time to half-value and
411 waveshape.

412 **3.2.3**

413 **acceptance test**

414 contractual test to prove to the customer that the item meets certain conditions of its
415 specification

416 [SOURCE IEC 60050-151:2001, 151-16-23]

417 **3.2.4**

418 **combination SPD**

419 SPD that contains either at least one combination mode of protection or at least one voltage
420 limiting mode of protection and one voltage switching mode of protection

421 **3.2.5**

422 **combination mode of protection**

423 Mode of protection that incorporates both, voltage switching components and voltage limiting
424 components

425 **3.2.6**

426 **combination wave**

427 wave characterized by defined voltage amplitude (U_{OC}) and waveshape under open-circuit
428 conditions and a defined current amplitude (I_{CW}) and waveshape under short-circuit
429 conditions

430 Note 1 to entry: The voltage amplitude, current amplitude and waveform that is delivered to the SPD are
431 determined by the combination wave generator (CWG) impedance Z_f and the impedance of the DUT.

432 **3.2.7**

433 **combination wave generator short-circuit current**

434 I_{CW}