



**SLOVENSKI STANDARD**  
**oSIST FprEN 61643-11:2009**  
**01-december-2009**

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B]n\_cbUdYrcgfbY'bUdfUj Y'nU'nUý ]rc`dfYX`dfYbUdYrcgfb]a ]i XUF]!'`%%'XY.'BUdfUj Y  
nU'nUý ]rc`dfYX`dfYbUdYrcgfb]a ]i XUF]nU'b]n\_cbUdYrcgfbY'g]ghYa Y!'NU hYj UbY  
`Ugfbcg]`]b`dfYg\_i gbYa YrcXY

Low-voltage surge protective devices -- Part 11: Surge protective devices connected to low-voltage power distribution systems - Performance requirements and testing methods

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Parafoudres basse-tension -- Partie 11: Parafoudres connectés aux réseaux de distribution basse tension - Exigences de fonctionnement et méthodes d'essais

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**Ta slovenski standard je istoveten z: FprEN 61643-11**

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**ICS:**

29.130.20	Nizkonapetostne stikalne in krmilne naprave	Low voltage switchgear and controlgear
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## 37A/216/CDV

COMMITTEE DRAFT FOR VOTE (CDV)  
PROJET DE COMITÉ POUR VOTE (CDV)

Project number Numéro de projet		IEC 61643-11 Ed. 1.0	
IEC/TC or SC: <b>SC 37A</b> CEI/CE ou SC:		Secretariat / Secrétariat <b>USA</b>	
<input checked="" type="checkbox"/> Submitted for parallel voting in CENELEC Soumis au vote parallèle au CENELEC	Date of circulation Date de diffusion <b>2009-09-18</b>	Closing date for voting (Voting mandatory for P-members) Date de clôture du vote (Vote obligatoire pour les membres (P)) <b>2010-02-19</b>	
Also of interest to the following committees Intéresse également les comités suivants		Supersedes document Remplace le document 37A/207A/CD and 37A/213A/CC	
Proposed horizontal standard Norme horizontale suggérée <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the TC/SC secretary Les autres CE/SC sont requis d'indiquer leur intérêt, si nécessaire, dans ce CDV à l'intention du secrétaire du CE/SC			
Functions concerned Fonctions concernées <input type="checkbox"/> Safety Sécurité			
<input type="checkbox"/> EMC CEM			
<input type="checkbox"/> Environment Environnement			
<input type="checkbox"/> Quality assurance Assurance qualité			

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Titre : CEI 61643-11 Ed. 1.0: Parafoudres basse tension – Partie 11: Parafoudres connectés aux réseaux de distribution basse tension – Exigences de fonctionnement et méthodes d'essais

Titre : IEC 61643-11 Ed. 1.0: Low-voltage surge protective devices - Part 11: Surge protective devices connected to Low-voltage power distribution systems - Performance requirements and testing methods

Note d'introduction

Introductory note

**ATTENTION  
VOTE PARALLÈLE  
CEI – CENELEC**

L'attention des Comités nationaux de la CEI, membres du CENELEC, est attirée sur le fait que ce projet de comité pour vote (CDV) de Norme internationale est soumis au vote parallèle.

Les membres du CENELEC sont invités à voter via le système de vote en ligne du CENELEC.

**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) for an International Standard is submitted for parallel voting.

The CENELEC members are invited to vote through the CENELEC online voting system.

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**INTERNATIONAL ELECTROTECHNICAL COMMISSION**

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**LOW-VOLTAGE SURGE PROTECTIVE DEVICES**

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**Part 11: Surge protective devices connected to low-voltage  
power distribution systems – Performance requirements and testing  
methods**

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**FOREWORD**

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International Standard IEC 61643-11 has been prepared by subcommittee 37A: Low-voltage surge protective devices, of IEC technical committee 37: Surge arresters.

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169

This project is based on the complete restructuring of the former IEC 61643-1 and simplification of the test procedures and test sequences.

170

This draft includes the comments that WG5 agreed to in Vienna and Athens.

171

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

172

FDIS	Report on voting

173

174

175

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



- 176 Annexes A, B, C and F are normative and Annexes D, E, G and H are informative only.
- 177 IEC 61643 consists of the following parts, under the general title: Surge protective devices  
178 connected to low-voltage power distribution systems:
- 179 – Part 11: Performance requirements and testing methods.  
180 – Part 12: Selection and application principles

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181

## INTRODUCTION

182 The present standard addresses safety and performance tests for surge protective devices  
183 (SPDs).

184 There are three classes of tests:

185 The Class I test is intended to simulate partial conducted lightning current impulses. SPDs  
186 subjected to Class I test methods are generally recommended for locations at points of high  
187 exposure, e.g., line entrances to buildings protected by lightning protection systems.

188 SPDs tested to Class II or III test methods are subjected to impulses of shorter duration.

189 All SPDs are tested on a “black box” basis as far as possible.

190 Part 12 addresses the selection and application principles of SPDs in practical situations.

191

192 This International Standard IEC 61643-11 has been prepared by subcommittee 37A: Low-voltage surge protective  
193 devices, of IEC technical committee 37: Surge arresters.

194 The text of this document is based on the following documents:

195

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196

197 Full information on the voting for the approval of this amendment can be found in the report on voting indicated in  
198 the above table. [https://standards.iteh.ai/catalog/standards/sist/c066cb5b-5dd3-4a0f-9ed8-](https://standards.iteh.ai/catalog/standards/sist/c066cb5b-5dd3-4a0f-9ed8-4278b4318847/sist-prn61643-11-2009)

199 The committee has decided that the contents of the base publication and its amendments will remain unchanged  
200 until xxxx. At this date<sup>1</sup>, the publication will be

- 201 • reconfirmed;
- 202 • withdrawn;
- 203 • replaced by a revised edition, or
- 204 • amended

205

206 *IEC 61643-11: Low-voltage surge protective devices – Part 11: Surge protective devices connected to low-voltage*  
207 *power distribution systems – Performance requirements and testing methods*

<sup>1</sup> The National Committees are requested to note that for this publication the maintenance result date is 2013.

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## LOW-VOLTAGE SURGE PROTECTIVE DEVICES

### Part 11: Surge protective devices connected to low-voltage power distribution systems – Performance requirements and testing methods

#### 214 1 Scope

215 This part of IEC 61643 is applicable to devices for surge protection against indirect and direct  
216 effects of lightning or other transient overvoltages. These devices are packaged to be  
217 connected to 50/60 Hz a.c. power circuits, and equipment rated up to 1,000 V r.m.s.  
218 Performance characteristics, standard methods for testing and ratings are established. These  
219 devices contain at least one nonlinear component and are intended to limit surge voltages  
220 and divert surge currents.

#### 221 2 Normative references

222 The following normative documents contain provisions, which, through reference in this text,  
223 constitute provisions of this part of IEC 61643. At the time of publication, the editions  
224 indicated were valid. All normative documents are subject to revision, and parties to  
225 agreements based on this part of IEC 61643 are encouraged to investigate the possibility of  
226 applying the most recent editions of the normative documents indicated below. Members of  
227 IEC and ISO maintain registers of currently valid International Standards.

228 IEC 60060-1, High-voltage test techniques – Part 1: General definitions and test requirements

229 IEC 60068-2-14:1986, Tests. Test N: Change of temperature  
[https://standards.iteh.ai/catalog/standards/sist/c066eb5b-5dd3-4a0f-9ed8-](https://standards.iteh.ai/catalog/standards/sist/c066eb5b-5dd3-4a0f-9ed8-a248b4318847/osist-fpr-en-61643-11-2009)

230 IEC 60099-4:2004, *Surge arresters – Part 4: Metal oxide surge arresters without gaps for a.c.*  
231 *systems*

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

234 IEC 60320 (all parts), *Appliance couplers for household and similar general purposes*

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

236 IEC 60664-1:2002, *Insulation coordination for equipment within low-voltage systems - Part 1:*  
237 *Principles, requirements and tests*

238 IEC 60695-2-11:xxx, *Fire hazard testing – Part 2-11: Test method - Glow wire end-product*  
239 *test and guidance*

240 IEC 60884-1:1994, *Plugs and socket outlets for household and similar purposes – Part 1:*  
241 *General requirements; Amendment 1 (1994); Amendment 2 (1995)*

242 IEC 60947-1:1996, *Low voltage switchgear and control gear – Part 1: General rules*

243 IEC 61643-12: *Surge protective devices connected to low-voltage power distribution systems*  
244 *- Part 12: Selection and application principles*

245 IEC 61180-1, *High-voltage test techniques for low voltage equipment – Part 1: Definitions, test*  
246 *and procedure requirements*

247 IEC 60364-4-44:2007, *Electrical installations of buildings – Part 4-44: Protection for safety –*  
 248 *Protection against voltage disturbances and electromagnetic disturbances*

249 IEC 60364-5-51: *Electrical installations of buildings –Part 5-51: Selection and erection of*  
 250 *electrical equipment – Common rules*

251 IEC 60364-5-53 *Electrical Installations of buildings selection and erection of electrical*  
 252 *equipment, isolation, switching and, control.*

### 253 3 Definitions and Abbreviations

254 For the purpose of this part of IEC 61643, the following definitions apply.

#### 255 3.1

#### 256 surge protective device

#### 257 SPD

258 device that contains at least one nonlinear component that is intended to limit surge voltages  
 259 and divert surge currents

260 NOTE: An SPD is a complete assembly, having appropriate connecting means.

#### 261 3.2

#### 262 one-port SPD

263 SPD having no intended series impedance

264 NOTE: A one port SPD may have separate input and output connections.

#### 265 3.3

#### 266 two-port SPD

267 SPD having a specific series impedance connected between separate input and output  
 268 connections

#### 269 3.4

#### 270 voltage switching type SPD

271 SPD that has a high impedance when no surge is present, but can have a sudden change in  
 272 impedance to a low value in response to a voltage surge

273 NOTE Common examples of components used in voltage switching type SPDs are spark gaps, gas tubes and  
 274 thyristors. These are sometimes called "crowbar type" components

#### 275 3.5

#### 276 voltage limiting type SPD

277 SPD that has a high impedance when no surge is present, but will reduce it continuously with  
 278 increased surge current and voltage

279 NOTE Common examples of components used in voltage limiting type SPDs are varistors and avalanche  
 280 breakdown diodes. These are sometimes called "clamping type" components.

#### 281 3.6

#### 282 combination type SPD

283 SPD that incorporates both, voltage switching components and voltage limiting components.  
 284 The SPD may exhibit voltage switching, limiting or both

#### 285 3.7

#### 286 short-circuiting type SPD

287 SPD tested according to Class II tests which changes its characteristic to an intentional  
 288 internal short-circuit due to a surge current exceeding its nominal discharge current  $I_n$

- 289 **3.8**  
 290 **mode of protection of a SPD**  
 291 an intended current path, between terminals that contains protective components, e.g. line-to-  
 292 line, line-to-earth, line-to-neutral, neutral-to-earth.
- 293 **3.9**  
 294 **nominal discharge current**  
 295  $I_n$   
 296 crest value of the current through the SPD having a current waveshape of 8/20
- 297 NOTE:  $I_n$  is used for the determination of the residual voltage and for the operating duty test for test class II
- 298 **3.10**  
 299 **impulse discharge current for class I test**  
 300  $I_{imp}$   
 301 crest value of a discharge current through the SPD with specified charge transfer  $Q$  and  
 302 specified energy  $W/R$  in the specified time
- 303 **3.11**  
 304 **maximum continuous operating voltage**  
 305  $U_c$   
 306 maximum r.m.s. voltage, which may be continuously applied to the SPD's mode of protection
- 307 NOTE: The  $U_c$  value covered by this document may exceed 1000 V.
- 308 **3.12**  
 309 **follow current**  
 310  $I_f$   
 311 peak current supplied by the electrical power system and flowing through the SPD after a  
 312 discharge current impulse  
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- 313 **3.13**  
 314 **rated load current**  
 315  $I_L$   
 316 maximum continuous rated r.m.s. current that can be supplied to a resistive load connected to  
 317 the protected output of an SPD
- 318 **3.14**  
 319 **voltage protection level**  
 320  $U_p$   
 321 maximum voltage to be expected at the SPD terminals due to an impulse stress with defined  
 322 voltage steepness and an impulse stress with a discharge current with given amplitude and  
 323 waveshape.
- 324 NOTE: The voltage protection level is given by the manufacturer and may not be exceeded by:
- 325 - the measured limiting voltage, determined for front-of-wave sparkover (if applicable) and the measured  
 326 limiting voltage, determined from the residual voltage measurements at amplitudes corresponding to  $I_n$   
 327 and/or  $I_{imp}$  for test classes I and II
  - 328 - the measured limiting voltage at  $U_{oc}$ , determined for the combination wave for test class III
- 329 **3.15**  
 330 **measured limiting voltage**  
 331 highest value of voltage that is measured across the terminals of the SPD during the  
 332 application of impulses of specified waveshape and amplitude

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333 **3.16**  
 334 **residual voltage**  
 335  $U_{res}$   
 336 crest value of voltage that appears between the terminals of an SPD due to the passage of  
 337 discharge current

338 **3.17**  
 339 **temporary overvoltage test value**  
 340  $U_T$   
 341 test voltage applied to the SPD for a specific duration  $t_T$ , to simulate the stress under TOV  
 342 conditions

343 **3.18**  
 344 **load-side surge withstand capability for a two-port SPD**  
 345 ability of a two-port SPD to withstand surges on the output terminals originating in circuitry  
 346 downstream of the SPD

347 **3.19**  
 348 **voltage rate-of-rise of a two-port SPD**  
 349 rate of change of voltage with time measured at the output terminals of a two port SPD under  
 350 specified test conditions

351 **3.20**  
 352 **1,2/50 voltage impulse**  
 353 voltage impulse with a nominal virtual front time of 1,2  $\mu$ s and a nominal time to half-value of  
 354 50  $\mu$ s

355 NOTE. IEC 60060-1 (1989) Section 6 defines the voltage impulse definitions of front time, time to half-value and  
 356 waveshape tolerance.

357 **3.21**  
 358 **8/20 current impulse**  
 359 current impulse with a nominal virtual front time of 8  $\mu$ s and a nominal time to half-value of  
 360 20  $\mu$ s

361 NOTE: IEC 60060-1 (1989) Section 8 defines the current impulse definitions of front time, time to half-value and  
 362 waveshape tolerance.

363 **3.22**  
 364 **combination wave**  
 365 a wave characterized by defined amplitude ( $U_{OC}$ ) and waveshape under open-circuit conditions  
 366 and a defined amplitude ( $I_{CW}$ ) and waveshape under short-circuit conditions

367 NOTE The voltage amplitude, current amplitude and waveform that is delivered to the SPD are determined by the  
 368 combination wave generator (CWG) impedance and the impedance of the DUT.

369 **3.23**  
 370 **Open circuit voltage**  
 371  $U_{OC}$   
 372 Open circuit impulse voltage of the combination wave generator at the point of connection of  
 373 the device under test.

374 **3.24**  
 375 **Combination Wave Generator short-circuit current**  
 376  $I_{CW}$   
 377 Prospective Impulse Short-circuit current of the combination wave generator, at the point of  
 378 connection of the device under test

379 NOTE: When the SPD is connected to the Combination Wave Generator, the current that flows through the device  
 380 is generally lesser than  $I_{CW}$

- 381 **3.25**  
 382 **thermal runaway**  
 383 operational condition when the sustained power dissipation of an SPD exceeds the thermal  
 384 dissipation capability of the SPD component, housing and connection, leading to a cumulative  
 385 increase in the temperature of the internal elements and resulting in failure
- 386 **3.26**  
 387 **thermal stability**  
 388 SPD is thermally stable if, after heating up during the operating duty test, its temperature  
 389 decreases with time while energized at specified maximum continuous operating voltage and  
 390 at specified ambient temperature conditions
- 391 **3.27**  
 392 **degradation (of performance)**  
 393 undesired permanent departure in the operational performance of equipment or a system from  
 394 its intended performance
- 395 **3.28**  
 396 **short-circuit current rating**  
 397  $I_{SCCR}$   
 398 maximum prospective short-circuit current from the power system for which the SPD, in  
 399 conjunction with the disconnectors specified, is rated
- 400 **3.29**  
 401 **SPD disconnector**  
 402 device for disconnecting an SPD, or part of an SPD, from the power system
- 403 NOTE: This disconnecting device is not required to have isolating capability for safety purposes. It is to prevent a  
 404 persistent fault on the system and is used to give an indication of an SPD's failure. Disconnectors can be internal  
 405 (built in) or external (required by the manufacturer). There may be more than one disconnector function, for  
 406 example an over-current protection function and a thermal protection function. These functions may be in separate  
 407 units.
- 408 **3.30**  
 409 **degree of protection of enclosure**  
 410 **IP**  
 411 numerical classification preceded by the symbol IP indicating the extent of protection provided  
 412 by an enclosure against access to hazardous parts, against ingress of solid foreign objects  
 413 and possibly harmful ingress of water
- 414 **3.31**  
 415 **type test**  
 416 conformity test made on one or more items representative of the production.  
 417 (IEV 151-16-16)
- 418 **3.32**  
 419 **routine tests**  
 420 tests made on each SPD or on parts and materials as required to ensure that the product  
 421 meets the design specifications  
 422 (IEV 151-16-17)
- 423 **3.33**  
 424 **acceptance tests**  
 425 contractual test to prove to the customer that the item meets certain conditions of its  
 426 specification  
 427 (IEV 151-16-23)