



**SLOVENSKI STANDARD**  
**oSIST prEN 50628:2015**  
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**Namestitev električnih inštalacij v podzemnih rudnikih**

Erection of electrical installations in underground mines

Errichten elektrischer Anlagen im Bergbau unter Tage

Construction des installations électriques dans les mines souterraines

**Ta slovenski standard je istoveten z: prEN 50628:2014**

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**ICS:**

29.260.20	Električni aparati za eksplozivna ozračja	Electrical apparatus for explosive atmospheres
73.100.01	Rudarska oprema na splošno	Mining equipment in general

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
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ICS

English Version

## Erection of electrical installations in underground mines

Construction des installations électriques dans les mines  
souterraines

Errichten elektrischer Anlagen im Bergbau unter Tage

This draft European Standard is submitted to CENELEC members for enquiry.  
Deadline for CENELEC: 2015-04-10.

It has been drawn up by CLC/TC 31.

If this draft becomes a European Standard, CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

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**prEN 50628:2014(E)****113 Foreword**

114 This document (prEN 50628:2014) was prepared by CLC/TC 31 WG11 “Electrical apparatus for potentially  
115 explosive atmospheres - Safety requirements for the erection of electrical installations in underground mines”.

116 This document is currently submitted to the enquiry.

117 This document is to be read in conjunction with the European Standards for the specific types of protection  
118 listed in EN 60079 series of standards.

119 This document is also to be read in conjunction with EN 1127-2:2010.

120 This document has been prepared under a mandate given to CENELEC by the European Commission and  
121 the European Free Trade Association, and supports essential requirements of EU Directive <sup>1)</sup>.

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<sup>1)</sup> For the relationship with EU Directive, TC 31 is supposed to provide an Annex ZZ for the ATEX directive before voting stage.

## 122 Introduction

123 When electrical equipment is to be installed in underground workings where dangerous concentration of  
124 methane may be present in the atmosphere protective measures are applied to avoid the ignition of firedamp  
125 either under normal operation of the electrical installation or under fault conditions.

126 Mines can be either gassy or non-gassy depending upon the mineral/material being extracted and whether or  
127 not firedamp can occur in the workings. It is usual practice to consider all coal mines as gassy mines. Non-  
128 coal mines can however, also be susceptible to the occurrence of firedamp e. g. if they are mining  
129 minerals/materials in the vicinity of oil bearing strata or unworked coal seams which are to be disturbed by the  
130 mining process, or are susceptible to outbursts of flammable gas.

131 Due to the fact that in underground workings firedamp is the main hazard that is to be considered all pieces of  
132 electrical equipment are to be selected with regard to this hazard. If there are other significant explosive  
133 atmospheres than firedamp the hazard occurring from these explosive atmospheres are to be taken into  
134 account.

135 Directive 2014/34/EU extends the definition of potentially explosive atmosphere to include combustible dust as  
136 well as firedamp. Extensive research<sup>1</sup> has shown that the minimum ignition energy (MIE) of coal dust/ air  
137 mixture is several hundred times higher than that of a firedamp/ air mixture and that the maximum  
138 experimental safe gap (MESG) for coal dust particles is more than double that for firedamp. It is therefore  
139 reasonable to assume that equipment, protective systems and components that are designed and constructed  
140 for use in firedamp/ air mixtures are also suitable for use in coal dust/ air mixtures.

141 Unlike group II it is to be assumed that in group I industry nearly all underground workings are to be classified  
142 as hazardous areas. A zone classification for such underground workings is not possible because the degree  
143 of exposure of such an underground working doesn't depend on local parameters but on time parameters. In  
144 accordance with 2014/34/EU (ATEX-Directive) the exposure of the installed equipment may change from  
145 normally acceptable methane concentration in the mine air (hazardous condition 2; M2 equipment sufficient)  
146 to elevated methane concentration (hazardous condition 1; M1 equipment required, M2 equipment to be de-  
147 energized) and vice versa.

148 Areas of a coal mine could be non-hazardous according to national regulations. In such areas equipment that  
149 is not ATEX approved may be used subject to the risk assessment and maybe associated rules.

150 In non-gassy mines it can be possible that in certain regions in the underground workings explosive  
151 atmospheres can occur. In these cases national regulations will apply.

152 In mines where the atmosphere, in addition to firedamp, may contain significant proportions of other  
153 flammable gases than methane, the installed Group I equipment complies also with the subdivision of Group II  
154 corresponding to the other significant flammable gases.

155 In any underground working, irrespective of the size, there may be numerous sources of ignition apart from  
156 those associated with electrical equipment. Precautions may be necessary to ensure safety from other  
157 possible ignition sources, but guidance on this aspect is outside the scope of this standard.

158 Underground mining activities cause other special problems to the electrical installation as well than arising  
159 from firedamp. Rough environmental conditions evoked by climate – temperature and humidity e.g. – rock  
160 pressure caused by depth, geometric dimensions of the underground workings, the winning process itself and  
161 other similar circumstances require therefore special specifications to the electrical installation in underground  
162 mines.

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1 Survey on the use of flameproof enclosures in coal dust and methane atmospheres, G. A. Lunn, SM/97/01.



## prEN 50628:2014(E)

163 **1 Scope**

164 This European standard EN 50628 specifies the safety requirements for the erection of electrical installations.

165 This standard is supplementary to other relevant harmonized standards, for example HD 60364 series and  
166 EN 61936-series as regards electrical installation requirements.

167 This part also refers to EN 60079-0 and its associated standards for the construction, testing and marking  
168 requirements of suitable electrical equipment.

169 EN 60079-14 standard gives the specific requirements for design, selection and erection of electrical  
170 installations in explosive atmospheres.

171

172 NOTE 1 EN 60079-14 standard can apply to electrical installations in mines where explosive gas atmospheres other than  
173 firedamp can be formed and to electrical installations in the surface installation of mines.

174 NOTE 2 For next edition of EN6079-14 installation requirements for mining equipment might be implemented.

175 This standard applies to

176 a) Electrical installation in underground workings of mines.

177 b) Electrical installations and parts of electrical installation above ground, which are directly connected with  
178 the underground workings in functional and safety relating matters because of being part of the  
179 underground working process.

180 These are in particular

- 181 • Safety and monitoring devices relating to the power distribution of the underground workings,
- 182 • Telecommunication installation of hoisting and inclined haulage plants,
- 183 • Intrinsically safe electrical installations of above ground installation being part of underground  
184 workings,
- 185 • Remote control systems if they have to fulfil increased requirements relating to functional safety,
- 186 • Electrical installation and electrical equipment of ventilation systems and shaft casings above ground  
187 being endangered by methane of the underground ventilation,
- 188 • Methane drainage systems.

189 c) Electrical installation in underground workings outside mining if it is demanded of the competent national  
190 authorities.

191 National regulations of the mining authority shall remain unaffected.

192 This standard applies to installations at all voltages mentioned in **Clause 10**.

193 Requirements above both columns are requirements of all underground workings.

<b>Gassy mines</b>	<b>Other mines</b>
Requirements within left column are requirements for underground workings in the coal mining industry which could be endangered by firedamp.	Requirements within right column are requirements for underground workings of the coal mining industry not likely to be endangered by firedamp and for underground workings of none coal mining industry.

194  
195**2 Normative references**

196 The following documents, in whole or in part, are normatively referenced in this document and are  
 197 indispensable for its application. For dated references, only the edition cited applies. For undated references,  
 198 the latest edition of the referenced document (including any amendments) applies.

EN 50393	<i>Test methods and requirements for accessories for use on distribution cables of rated voltage 0.6/1.0 (1.2) kV</i>
EN 60038	<i>CENELEC standard voltages</i>
EN 60079-0	<i>Explosive atmospheres - Part 0: Equipment - General requirements</i>
EN 60079-7	<i>Explosive atmospheres - Part 7: Equipment protection by increased safety "e"</i>
EN 60079-10-1	<i>Explosive atmospheres - Part 10-1: Classification of areas - Explosive gas atmospheres</i>
EN 60079-10-2	<i>Explosive atmospheres - Part 10-2: Classification of areas - Explosive dust atmospheres</i>
EN 60079-11	<i>Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"</i>
EN 60079-14	<i>Explosive atmospheres - Part 14: Electrical installations design, selection and erection</i>
EN 60079-25	<i>Explosive atmospheres - Part 25: Intrinsically safe electrical systems</i>
EN 60204-1	<i>Safety of machinery - Electrical equipment of machines - Part 1: General requirements</i>
EN 60296	<i>Fluids for electrotechnical applications - Unused mineral insulating oils for transformers and switchgear</i>
EN 60309-1	<i>Plugs, socket-outlets and couplers for industrial purposes - Part 1: General requirements</i>
EN 60332-1-1	<i>Tests on electric and optical fibre cables under fire conditions - Part 1-1: Test for vertical flame propagation for a single insulated wire or cable - Apparatus</i>
EN 60332-1-2	<i>Tests on electric and optical fibre cables under fire conditions - Part 1-2: Test for vertical flame propagation for a single insulated wire or cable - Procedure for 1 kW pre-mixed flame</i>
EN 60332-2-1	<i>Tests on electric and optical fibre cables under fire conditions. Test for vertical flame propagation for a single small insulated wire or cable. Apparatus</i>
EN 60332-2-2	<i>Tests on electric and optical fibre cables under fire conditions - Part 2-2: Test for vertical flame propagation for a single small insulated wire or cable - Procedure for diffusion flame</i>
EN 60332-3-24	<i>Tests on electric and optical fibre cables under fire conditions - Part 3-24: Test for vertical flame spread of vertically-mounted bunched wires or cables - Category C</i>
EN 60529	<i>Degrees of protection provided by enclosures (IP code)</i>

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EN 60664-1	<i>Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests</i>
EN 60836	<i>Specifications for unused silicone insulating liquids for electrotechnical purposes</i>
EN 60865-1	<i>Short-circuit currents - Calculation of effects - Part 1: Definitions and calculation methods</i>
EN 60909	<i>Short-circuit currents in three-phase AC systems</i>
EN 61099	<i>Insulating liquids - Specifications for unused synthetic organic esters for electrical purposes</i>
EN 61557-6	<i>Electrical safety in low voltage distribution systems up to 1 000 V AC and 1 500 V DC - Equipment for testing, measuring or monitoring of protective measures - Part 6: Effectiveness of residual current devices (RCD) in TT, TN and IT systems</i>
EN 61557-8	<i>Electrical safety in low voltage distribution systems up to 1 000 V AC and 1 500 V DC - Equipment for testing, measuring or monitoring of protective measures - Part 8: Insulation monitoring devices for IT systems</i>
EN 61557-9	<i>Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. - Equipment for testing, measuring or monitoring of protective measures - Part 9: Equipment for insulation fault location in IT systems</i>
EN 61557-15	<i>Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. - Equipment for testing, measuring or monitoring of protective measures - Part 15: Functional safety requirements for insulation monitoring devices and for equipment for insulation fault location in IT systems</i>
HD 60364-4-41	<i>Low-voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock</i>
HD 60364-5-52	<i>Erection of low voltage installations - Part 5: Selection and erection of electrical equipment - Chapter 52: Wiring systems</i>
HD 631.1 S.2	<i>Electric cables. Accessories. Material characterization. Fingerprinting and type tests for resinous compounds</i>

199 **3 Terms and definitions**

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

201 **3.1 Mining operation / Road heading**202 **3.1.1**203 **mining operation**

204 a) in case of longwall mining: the face including the connected workings

205 Note 1 to entry: Connecting workings are up to 10 m on both sides of the face entrance. The face entrance is the area  
206 between the face and the latest complete row of the roof support.

207

208 b) in case of other mining methods: the production area including the connected workings

209 Note 2 to entry: Connecting workings are up to 10 m to the heading face.

210 Note 3 to entry: In case of greater mining operation areas, e.g. salt industry, the mining authority will decide.

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- 211
- 212 **3.1.2**
- 213 **roadheading**
- 214 parts of the underground workings where road heading activities are taking part up to 50 m far from the
- 215 roadhead
- 216 **3.2 Electrical installation**
- 217 **3.2.1**
- 218 **electrical power distribution**
- 219 electrical installation with pieces of equipment used for such purposes as generation, conversion, storing,
- 220 transmission, distribution or utilization of electric energy for mechanical work, for generation of heat and light
- 221 or for electrochemical processes
- 222 **3.2.2**
- 223 **switchgear**
- 224 general term covering switching devices and their combination with associated control, measuring, protective
- 225 and regulating equipment, also assemblies of such devices and equipment with associated interconnections,
- 226 accessories, enclosures and supporting structures, intended in principle for use in connection with generation,
- 227 transmission, distribution and conversion of electric energy
- 228 [IEV 441-11-02]
- 229 **3.2.3**
- 230 **electrical interference**
- 231 influence of an electric power installation on a telecommunication installation or between different
- 232 telecommunication installations depending on the coupling of capacitive, inductive or ohmic resistance
- 233 **3.2.4**
- 234 **erection of electrical installation**
- 235 new installation, redesign, extension or reconstruction of an electrical installation
- 236 Note 1 to entry: Replacing of electrical equipment by similar one or reducing the electrical installation is not redesign if the
- 237 electrical parameters will not change substantially.
- 238 **3.2.5**
- 239 **electrostatic earthing**
- 240 electrical equipment is electrostatically earthed if the leakage resistance against earth isn't bigger than a
- 241 specific value
- 242 Note 1 to entry: the leakage resistance against earth should not be bigger than  $10^6 \Omega$  or bigger than  $10^8 \Omega$  if the capacity is
- 243 less or equal than 100 pF.
- 244 **3.2.6**
- 245 **potential equalization in the field of intrinsically safe electrical systems and electric power**
- 246 **installations**
- 247 elimination of potential differences between different protective conductors of electrical power installations and
- 248 between exposed conductive parts of intrinsically safe electrical systems
- 249 **3.2.7**
- 250 **protective bonding conductor**
- 251 protective conductor provided for protective-equipotential-bonding
- 252 [IEV 826-13-24]
- 253 **3.2.8**
- 254 **communication system**
- 255 installation for transmitting and processing of messages and/or information (e.g. speech, tunes, pictures or
- 256 characters) including remote control information (e.g. measuring values, messages or instructions)
- 257 Note 1 to entry: A communication systems consist of broadcasting equipment, wireless or non-wireless transmission path,
- 258 receive terminal devices and the supplying equipment.

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259 **3.3 Electrical equipment**260 **3.3.1**261 **electrical equipment**

262 item used for such purposes as generation, conversion, transmission, distribution or utilization of electric  
 263 energy, such as electric machines, transformers, switchgear and controlgear, measuring instruments,  
 264 protective devices, wiring systems, current-using equipment

265 [IEV 826-16-01]

266 **3.3.2**267 **mobile electrical equipment**

268 electric equipment which is moved while in operation or which can easily be moved from one place to another  
 269 while connected to the supply

270 [IEV 826-16-04]

271 **3.3.3**272 **current using equipment**

273 electric equipment intended to convert electric energy into another form of energy, for example light, heat,  
 274 mechanical energy

275 [IEV 826-16-02]

276 **3.3.4**277 **hand-held equipment**

278 electric equipment intended to be held in the hand during normal use

279 [IEV 826-16-05]

280 **3.3.5**281 **switch**

282 device for changing the electric connections among its terminals

283 [IEV 151-12-22]

284 **3.3.6**285 **switchgear and controlgear**

286 electric equipment intended to be connected to an electric circuit for the purpose of carrying out one or more  
 287 of the following functions: protection, control, isolation, switching

288 Note 1 to entry: The French and English terms can be considered as equivalent in most cases. However the French terms  
 289 have a broader meaning than the English terms and includes for example connecting devices, plugs and sockets outlets  
 290 etc. In English, these latter devices are known as accessories.

291 [IEV 826-16-03]

292 **3.3.7**293 **remote controlled switchgear**

294 switchgear which is intended to switch on or off one or more electrical circuits by external activity, e.g.  
 295 mechanically, electrically, electro-optically, pneumatically, acoustically, or on a thermal or magnetic way and  
 296 where it is impossible to do it manually

297 **3.3.8**298 **convertor**

299 set of equipment, static or rotating, to convert one type of electric current to another type different in nature,  
 300 voltage and/or frequency

301 [IEV 811-19-01]

## prEN 50628:2014(E)

302 **3.4 Intrinsic safety**303 **3.4.1**304 **intrinsically safe electrical system**

305 assembly of interconnected items of electrical apparatus, described in a descriptive system document, in  
 306 which the circuits or parts of circuits, intended to be used in an explosive atmosphere, are intrinsically safe  
 307 circuits

308 [IEV 426-11-08]

309 **3.4.2**310 **intrinsically safe circuit**

311 circuit in which any spark or any thermal effect produced in the conditions specified in EN 60079-11, including  
 312 normal operation and specified fault conditions, are not capable of causing ignition of a given explosive gas  
 313 atmosphere

314 [IEV 426-11-01]

315 **3.4.3**316 **intrinsically safe electrical apparatus**

317 electrical apparatus in which all the circuits are intrinsically safe circuits

318 [IEV 426-11-02]

319 **3.4.4**320 **associated apparatus**

321 electrical apparatus which contains both intrinsically safe circuits and non-intrinsically safe circuits and is  
 322 constructed so that the non-intrinsically safe circuits cannot adversely affect the intrinsically safe circuits

323 Note 1 to entry: associated apparatus may be either

324 a) electrical apparatus which has another type of protection listed in EN 60079-0 for use in the  
 325 appropriate gas atmosphere, or

326 b) electrical apparatus not so protected and which, therefore, shall be not used within an explosive gas  
 327 atmosphere

328 [IEV 426-11-03]

329 **3.4.5**330 **accessory**

331 device supplementing a main device or apparatus, but not forming part of it, that is needed for its operation or  
 332 to confer on it specific characteristics

333 [IEV 151-11-24]

334 **3.5 Earthing**335 **3.5.1**336 **power system earthing**

337 functional earthing and protective earthing of a point or points in an electric power system

338 [IEV 826-13-11]

339 **3.5.2**340 **earth**

341 Make an electric connection between a given point in a system or in an installation or in equipment and local  
 342 earth.

343 Note 1 to entry: The connection to local earth maybe:

- 344 • intentional, or
- 345 • unintentional or accidental,
- 346 • and may be permanent or temporary.

347  
 348 [IEV 826-13-03]

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- 349 **3.5.3**  
 350 **earth-free exposed-conductive-part**  
 351 exposed-conductive part without any connection to earth or other earth bounded electrical equipment
- 352 **3.5.4**  
 353 **earth fault**  
 354 occurrence of an accidental conductive path between a live conductor and the Earth  
 355 [IEV 826-14-13]
- 356 **3.5.5**  
 357 **earth fault current**  
 358 current flowing to earth due to an insulation fault  
 359 [IEV 442-01-23]
- 360 **3.5.6**  
 361 **double earth fault**  
 362 insulation faults to earth occurring simultaneously at two different locations in one or several circuits  
 363 originating from a common source  
 364 [IEV 604-02-22]
- 365 **3.5.7**  
 366 **double earth fault current**  
 367 current in case of a double earth fault  
 368
- 369 **3.5.8**  
 370 **residual earth current**  
 371 earth current at the point of fault after compensation
- 372 **3.5.9**  
 373 **fault current**  
 374 current which flows across a given point of fault resulting from an insulation fault  
 375 [IEV 826-11-11]
- 376 **3.5.10**  
 377 **leakage current**  
 378 electric current in an unwanted conductive path under normal operating conditions  
 379 [IEV 826-11-20]
- 380 **3.5.11**  
 381 **functional earthing**  
 382 earthing a point or points in a system or in an installation or in equipment for purposes other than electrical  
 383 safety  
 384 [IEV 826-13-10]
- 385 **3.5.12**  
 386 **insulation fault**  
 387 defect in the insulation of an electrical installation or of an equipment which can create a resistive path to earth  
 388 Note 1 to entry: The insulation fault can appear as a single fault from one line conductor or as a symmetrical fault from all  
 389 line conductors  
 390 [IEV 604-02-02, modified]

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