



SLOVENSKI STANDARD
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Električne inštalacije za razsvetljavo in radijske javljalnike na letališčih - Posebne zahteve za napajalnike z zaporednim vezjem

Electrical installations for lighting and beaconing of aerodromes - Particular requirements for series circuit power supplies

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Installations électriques pour l'éclairage et le balisage des aérodromes - Régulateurs de courant constant

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SECRETARIAT: Spain	SECRETARY: Mrs Carmen Martín Marino
OF INTEREST TO THE FOLLOWING COMMITTEES:	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	
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TITLE:

Electrical installations for lighting and beaconing of aerodromes - Particular requirements for series circuit power supplies

PROPOSED STABILITY DATE: 2028

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRICAL INSTALLATIONS FOR LIGHTING
AND BEACONING OF AERODROMES –
PARTICULAR REQUIREMENTS FOR SERIES CIRCUIT POWER SUPPLIES**

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International Standard IEC 61820-3-2 has been prepared by IEC Technical Committee 97: Electrical installations for lighting and beaconing of aerodromes.

This publication cancels and replaces the second edition of IEC 61822 published in 2009. It is a technical revision.

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

a)

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

FDIS	Report on voting
97/XXX/FDIS	97/XXX/RVD

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

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

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

- 116 • reconfirmed,
- 117 • withdrawn,
- 118 • replaced by a revised edition, or
- 119 • amended.

120

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121 **ELECTRICAL INSTALLATIONS FOR LIGHTING**
122 **AND BEACONING OF AERODROMES –**
123 **PARTICULAR REQUIREMENTS FOR SERIES CIRCUIT POWER SUPPLIES**
124
125
126

Introduction

127 This standard introduces an open specification for power electronic converter systems
128 (PECS) to be used in aeronautical ground lighting (AGL) series circuit systems. The aim of
129 this open specification is to enable various new technologies to be used within AGL systems
130 while ensuring the safe operation and function of the AGL system based on specific items in a
131 series circuit topology.

132 To clarify the distinction between different series circuit power supplies, a new classification
133 system is introduced in clause 4 of this standard. A base class divides the power supplies into
134 PECS and CCRs. Therefore, within this standard, the term PECS refers to series circuit power
135 supplies belonging to the class *General PECS for AGL systems* and the term CCR refers to
136 series circuit power supplies belonging to the class *CCR for 6.6 ampere systems*. The term
137 PECS/CCR refers to both device classes. The class *CCR for 6.6 ampere AGL systems*
138 corresponds to the traditional series circuit power supplies as defined by the previous version
139 of this standard.

140 In addition to the base class, classes for voltage ranges and construction mechanics are
141 introduced. Where a part of this standard only refers to one or more specific AGL systems,
142 the systems in question will be clearly indicated.

143 The PECS may be non-interoperable with the 6.6 ampere system, but they shall be operated
144 within an AGL circuit with a series circuit topology. Here the degree of interoperability of
145 CCR's and PECS is defined by a reference to a specific primary AGL series circuit system.
146 This version also revises the definitions for the 6.6 ampere system.

147 <https://standards.iteh.ai/catalog/standards/sist/5d138bb8-3770-4571-bc7a->
148 The maintained version may be partially applicable to PECS dedicated to converting power
149 from a mains supply to power suited for AGL other than series circuit topology. The
150 maintenance work of 61822 into 61820-3-2 started before the writing of the related subparts
151 61820-3-1 and 61820-3-3 had started. This updated version may therefore be partially
152 applicable to PECS dedicated to converting power from a mains supply to power suited for
153 AGL systems with other than series circuit topology.

153 **1 Scope**

154 This part of the IEC 61820 specifies the requirements for power electronic converter systems
155 (PECS) dedicated to powering aeronautical ground lighting (AGL) circuits with series circuit
156 topology. An example of a traditional implementation is an AGL circuit with 6.6 A RMS
157 nominal current, powered by a constant current regulator (CCR). In addition to revising the
158 requirements for 6.6 A CCR setups, this standard introduces requirements for general PECS
159 for new AGL systems including ones specifically designed for LED based luminaires.

160 **2 Normative references**

161 The following referenced documents are indispensable for the application of this document.
162 For dated references, only the edition cited applies. For undated references, the latest edition
163 of the referenced document (including any amendments) applies.

164 IEC 60038, *IEC standard voltages*

165 IEC 60076-11 Power transformers - Part 11: Dry-type transformers

- 166 IEC 60529, *Degrees of protection provided by enclosures (IP Code)*
- 167 IEC 60721-3-3, *Classification of environmental conditions – Part 3-3: Classification of groups*
168 *of environmental parameters and their severities – Stationary use at weatherprotected*
169 *locations.*
- 170 IEC 61000-6-4, *Electromagnetic compatibility (EMC) – Part 6-4: Generic standards –*
171 *Emission standard for industrial environments*
- 172 IEC 61000-6-5, *Electromagnetic compatibility (EMC) – Part 6-5: Generic standards –*
173 *Immunity for power station and substation environments*
- 174 IEC 61024-1, *Protection of structures against lightning – Part 1: General principles*
- 175 IEC 61140, *Protection against electric shock – Common aspects for installation and*
176 *equipment*
- 177 IEC 61439-1, *Low-voltage switchgear and controlgear assemblies – Part 1: General rules*
- 178 IEC 61439-2, *Low-voltage switchgear and controlgear assemblies - Part 2: Power switchgear*
179 *and controlgear assemblies*
- 180 IEC 61508 (series) *Functional safety of electrical/electronic/programmable electronic safety-*
181 *related systems*
- 182 IEC 61820-1-1, *Electrical installations for aeronautical ground lighting at aerodromes - Part 1:*
183 *Fundamental principles*
- 184 IEC 61820-1-2, *Electrical installations for aeronautical ground lighting at aerodromes - Part 2:*
185 *Requirements for series circuits (97/219/CD) – closing comments 2020-12-25*
<https://standards.iteh.ai/catalog/standards/sist/5f138bb8-3770-4571-bc7a-9b81e2e041e1/iec-61820-3-2:2023>
- 186 IEC 61822:2009, *Electrical installations for lighting and beaconing of aerodromes - Constant current*
187 *regulators*
- 188 IEC 62305-1, *Protection against lightning – Part 1: General principles*
- 189 IEC 62305-3, *Protection against lightning – Part 3: Physical damage to structures and life*
190 *hazard*
- 191 IEC 62443-4-2, *Security for industrial automation and control systems - Part 4-2: Technical security*
192 *requirements for IACS components*
- 193 IEC 62477-1, *Safety requirements for power electronic converter systems and equipment –*
194 *Part 1: General (rated system voltage not exceeding 1 000 V a.c. or 1 500 V d.c.)*
- 195 IEC 62477-2, *Safety requirements for power electronic converter systems and equipment -*
196 *Part 2: Power electronic converters from 1 000 V AC or 1 500 V DC up to 36 kV AC or 54 kV*
197 *DC*
- 198 CISPR 11, *Industrial, scientific and medical (ISM) radio-frequency equipment – Electromagnetic*
199 *disturbance characteristics – Limits and methods of measurement*
- 200 CISPR 22, *Information technology equipment – Radio disturbance characteristics – Limits and*
201 *methods of measurement*

202 3 Terms and definitions

203 For the purposes of this document, the following terms and definitions developed to be
204 included in international standards relating to airport/aerodrome visual aids apply

205 3.1

206 **aeronautical ground lighting (AGL) constant current series circuit**

207 apparatus configured as an electrical circuit designed to produce and operate with a constant
208 current, independent of variations in the load, in order to provide a specified light output for
209 aeronautical purposes

210 3.2

211 **constant current regulator (CCR)**

212 apparatus which produces a current output at a constant RMS value independent of variations
213 in the constant current series circuit load, input voltage and service conditions as specified.
214 Within this standard the term CCR is reserved for series circuit power supplies belonging to
215 the class *CCR for 6.6 ampere AGL systems*.

216 NOTE it is acknowledged that legacy systems still in use across the world also use alternative current ratings such
217 as 8.33 A and 12 A but 6.6 A is the present standard. For the purposes of this document 6.6 A systems will be
218 referenced only)

219 3.3

220 **open circuit**

221 AGL constant current series circuit with an unplanned interruption at any location of the
222 primary current line that produces a hazardous high voltage between the interrupted circuit
223 sections

224 3.4

225 **forced ventilation**

226 cooling system in which the air is moved by external power

227 3.5

228 **live**

229 electrically connected to a source of electricity or having acquired a charge by other means

230 3.6

231 **power electronic converter (PEC)**

232 device or part thereof for the purpose of electronic power conversion, including signalling,
233 measurement, control circuitries and other parts, if essential for the power conversion function
234 [SOURCE: IEC 62477-1:2012]

235 3.7

236 **power electronic converter system (PECS)**

237 one or more power electronic converters intended to work together with other equipment
238 [SOURCE: IEC 62477-1:2012]

239 NOTE within this standard the term PECS is reserved for series circuit power supplies belonging to the class
240 General PECS for AGL systems

241 3.8 PECS/CCR

242 series circuit power supply belonging to either base class

243 3.9 Main transformer

244 transformer used for transferring energy and providing galvanic isolation between the mains
245 input of the PECS/CCR and the series circuit.

246 3.10 Local control

247 controlling functions affecting the output and thereby the AGL fixture brightness levels within
248 the series circuit power by the PECS/CCR from within the immediate vicinity of the
249 PECS/CCR (implemented on the PECS/CCR, or on a separate control device within the same
250 substation in which the PECS/CCR is installed)

251 3.11 Remote control

252 control equipment which can alter the output state of the PECS/CCR and thereby the AGL
253 Lighting fixture brilliancy and is located remotely to the substation where the PECS/CCR is
254 installed, typically this is from the Airfield Control tower

255 **NOTE remote control can be implemented by parallel wiring switched in response to**
256 **Airfield Control tower changes or via serial communications using a fibre optic or**
257 **copper wire cable between the tower and the remotely located equipment)**
258

259 4 Classification

260 4.1 Base classes

261 The PECS or CCR shall be classified into one of the following base classes:

- 262 • General PECS for AGL systems
 - 263 ○ The General PECS for AGL systems may control the AGL fixture brightness via
 - 264 stabilized series circuit primary effective current. The General PECS for AGL
 - 265 systems may also be used in combination with information controlled AGL
 - 266 fixtures. In information controlled AGL systems the AGL fixture brightness level
 - 267 may be independent of the effective current in the primary series circuit.

- 268 • CCR for 6.6 A AGL systems

- 269 ○ The 6.6 A system CCR shall control the brightness levels of the AGL fixtures
- 270 via stabilized series circuit RMS current with precisely defined maximum
- 271 current. The 6.6 A CCR category closely follows the definitions from IEC
- 272 61822:2009 and is capable of operating both halogen bulb and LED based
- 273 AGL Systems.

274 4.2 Voltage classes

275 The PECS/CCR shall be classified into one of the following categories based on the maximum
276 available output voltage:

- 277 • Low voltage PECS/CCRs
 - 278 ○ The maximum output voltage of a low voltage PECS/CCR shall not exceed
 - 279 1 000 V AC
- 280 • High voltage PECS/CCRs
 - 281 ○ The maximum output voltage of a high voltage PECS/CCR shall not exceed
 - 282 5 000 V AC

283 NOTE Within this standard the term high voltage refers to voltages greater than 1 kV. In other contexts, this
284 voltage range is often referred to as medium voltage.

285 NOTE For Safety Electrical Low Voltage and Protective Extra low voltage circuit refer to the dedicated standard
286 IEC 61820-3-4.

287 4.3 Construction classes

288 The PECS/CCR shall be classified into one of the following categories based on the
289 mechanical construction:

- 290 • Self-contained PECS/CCR

291 A self-contained PECS/CCR is defined as a unit with all its components integral to one
292 individual and purpose-built housing. The self-contained unit takes an input power supply
293 and converts this to a series circuit primary current to power and control AGL fixtures. The
294 complete process of power conversion takes place within the housing of the PECS/CCR
295 with the input and output defined within this document. Self-contained PECS/CCR are
296 typically delivered at the end user in its final form.

- 297 • Switchgear assemblies

298 A Switchgear assembly is defined as a PECS or CCR consisting of an assembly of sub-
299 parts or modular parts. The complete assembly takes an input power supply and converts
300 this to a series circuit primary current to power and control AGL fixtures. These
301 assemblies consist of parts or modules that perform a subtask of process of the power
302 electronic conversion. The switchgear assembly maybe used to separate low voltage and
303 high voltage parts physically in different enclosures or rooms. Switchgear assembly parts
304 or modules are typically connected and mounted by the end user to finalize the assembly.

305 The degree of interoperability of CCRs and PECS is defined by a reference to a specific
306 primary AGL series circuit system. The 6.6 ampere AGL system is an example of such
307 system.

308 5 Requirements

309 5.1 General

310 The following requirements are grouped into five categories: environmental, functional,
311 performance, and design requirements and protection against electric shock.

312 5.2 Environmental requirements

313 The environmental condition classifications follow the definitions given in IEC 60721-3-3.

314 5.2.1 Environmental conditions

315 A PECS/CCR designed for continuous indoor operation without derating, shall follow the
316 provisions for environmental condition of either E20 or E21, as defined in IEC 61820-1 and
317 under one of the following temperature ranges:

- 318 • Indoor temperature range: from +5 °C to +40 °C (3K3);
- 319 • Normal temperature range: from +0 °C to +50 °C;
- 320 • Extreme temperature range: from -40 °C to +55 °C (3K7 with 3Z11).

321 If the temperature range of the equipment is not explicitly specified, the PECS/CCR shall be
322 designed for operation under the normal temperature range.

323 A PECS/CCR designed for outdoor use shall follow the provisions for environmental condition
324 of E10, as defined in IEC 61820-1.

325 The CCRs for 6.6 ampere AGL systems following climatic conditions 3K3 may be designed to
326 operate in altitude conditions from sea-level to 1000 m. The limited altitude conditions of 1000
327 m shall be explicitly mentioned in the documentation.

328 A climate-controlled environment is recommended for PECS/CCR installations.

329 NOTE For PECS used externally, a specific temperature range can be defined if it is clearly mentioned in the
330 product documentation.