



SLOVENSKI STANDARD
oSIST prEN IEC 63404:2023

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**Stikalne in krmilne naprave ter njihovi sestavi za uporabo pri nizki napetosti -
Metoda integracije radiokomunikacijske naprave v opremo**

Switchgear and controlgear and their assemblies for low voltage - Integration method of radiocommunication device into an equipment

iTeh STANDARD PREVIEW
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Appareillages et ensembles d'appareillages basse tension Méthode d'intégration de dispositif de radiocommunication dans un équipement

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OF INTEREST TO THE FOLLOWING COMMITTEES: TC 22, SC 22G, SC 22H, TC 23, SC 23E, TC 44, TC 64, SC 65C, SC 77B, TC 85, TC 94, SC 121A, SC 121B	PROPOSED HORIZONTAL STANDARD: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
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Switchgear and controlgear and their assemblies for low voltage – Integration method of radiocommunication device into an equipment

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**SWITCHGEAR AND CONTROLGEAR AND
THEIR ASSEMBLIES FOR LOW VOLTAGE –**
Integration method of radiocommunication device into an equipment**FOREWORD**

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IEC 63404 has been prepared by IEC technical committee TC 121: Switchgear and controlgear and their assemblies for low voltage. It is an International Standard,

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

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

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

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

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

134 The committee has decided that the contents of this document will remain unchanged until the
135 stability date indicated on the IEC website under webstore.iec.ch in the data related to the
136 specific document. At this date, the document will be

- 137 • reconfirmed,
- 138 • withdrawn,
- 139 • replaced by a revised edition, or
- 140 • amended.
- 141

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143

INTRODUCTION

144 In the context of the fast evolution of radiocommunication technologies and the long lifetime of
145 low voltage equipment, this document proposes a method to simplify the updating of
146 radiocommunication devices within existing host equipment, including the hardware or the
147 software.

148 In this document, switchgear, controlgear, electrical accessories and assemblies are called
149 equipment.

150 The aim of this document is to limit the effort of retesting the host equipment when updating the
151 radiocommunication device in low voltage equipment (e.g. circuit-breaker, sensor, electric
152 actuator, etc.).

153 This document is intended to be referred by product standards within their requirements.

154 The test program has been elaborated based on the result of actual IEC 61000-4-39 testing by
155 equipment manufacturers and test laboratories. This test allows to characterise radiofrequency
156 band(s) and amplitude(s) which is called a capability profile. This capability profile can be used
157 to demonstrate the capability of an equipment to host various radiocommunication devices when
158 their characteristics are within the limits given by the capability profile.

159 The integration of a pre-evaluated radiocommunication device according to its technology
160 standard into a host equipment can affect its radio transmitter performances. This document
161 includes the verification of the radiocommunication functions after integration following the main
162 guidance from [ETSI EG 203 367](#), [FCC KDB 996369 D04](#), [MIIT No.129:2021](#) and GRFC N 07-
163 20-03-001:2007.

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LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR AND THEIR ASSEMBLIES

Integration method of radiocommunication device into an equipment

1 Scope

This document defines the methods of integrating a radiocommunication device, having a carrier frequency in the range covered by IEC 61000-4-39, into a host equipment with:

- The classification of integration categories;
- The verification method using a capability profile approach;
- The verification of the unwanted emission level of the radio transmitter.

This document also provides typical radiocommunication device integration use cases.

The object of these methods is to optimise the testing necessary when updating the host equipment with a new type of radiocommunication device.

In general, this document defines the generic requirements related to the radiocommunication function of an equipment. It complements the product standard of the host equipment with additional characteristics, performance, and tests.

In addition, this document provides guidance on considerations to be addressed in product standards including safety and security matter.

This document does not cover:

- Radiocommunication technologies (e.g. IEEE 802.11, IEEE 802.15.4);
- Allocation of radio frequencies;
- The impact on the application of the equipment

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 60417DB, Graphical symbols for use on equipment

IEC 61000-4-3, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-39, *Electromagnetic compatibility (EMC) – Part 4-39: Testing and measurement techniques – Radiated fields in close proximity – Immunity test*

IEC 62479, *Assessment of the compliance of low-power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz)*

IEC 62657-2, *Industrial communication networks – Wireless communication networks – Part 2: Coexistence management*

ISO 7000DB, *Graphical symbols for use on equipment*

207 3 Terms and definitions

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

209 ISO and IEC maintain terminological databases for use in standardization at the following
210 addresses:

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

213

214 3.1

215 radiocommunication device

216 radio transmitter intended to be integrated into an equipment for communication purpose

217 Note 1 to entry: The form of the device can be a complete single unit (module) or a set of associated elements
218 (antenna, transmitter, power supply, etc.)

219 Note 2 to entry: The original evaluation of the transmitter function can be associated with specific integration
220 instructions and operating conditions.

221 Note 3 to entry: A radiocommunication device can also support receiving capability.

222 3.2

223 radio transmitter

224 apparatus producing radio-frequency energy for the purpose of radiocommunication

225 [SOURCE: ITU-R V.573-4]

226 3.3

227 radio link

228 a telecommunication facility of specified characteristics between two points provided by means
229 of radio waves

230 [SOURCE: ITU-R V.573-5:2015, A21]

231 3.4

232 antenna gain

233 ratio, generally expressed in decibels, of the radiation intensity produced by an antenna in a
234 given direction to the radiation intensity that would be obtained if the power accepted by the
235 antenna were radiated equally in all directions

236 Note 1 to entry: If no direction is specified, the direction of maximum radiation intensity from the given antenna is
237 implied.

238 Note 2 to entry: The gain is frequently expressed in decibels with respect to an isotropic antenna which is expressed
239 in dBi.

240 [SOURCE: IEC TR 62630: 2010, 3.1.6, modified with a new Note 2 to entry replacing the original
241 one]

242 3.5

243 antenna port

244 port that is connected to an antenna, either direct or by a cable. The antenna may be external
245 or internal to the equipment or the radiocommunication device

246 Note 1 to entry: Antenna ports connected to antennas internal to the equipment or the radiocommunication device
247 are covered by signal ports.

248 [SOURCE: IEC 61000-6-6:2003, 4.1, modified with equipment or the radiocommunication
249 device]

250 3.5.1

251 equivalent radiated power

252 ERP

253 product of the power supplied to the antenna and the maximum antenna gain relative to a half-
254 wave dipole

255 [SOURCE: ITU-T]

256 **3.5.2**
257 **equivalent isotropically radiated power**
258 EIRP
259 product of the power accepted by the antenna and the maximum antenna gain relative to an
260 isotropic antenna

261 [SOURCE: ITU-T K.100:2019]

262 **3.6**
263 **host equipment** <radiocommunication>
264 switchgear, controlgear, electrical accessory for fixed installation or assembly, intended to host
265 a radiocommunication device

266 **3.7**
267 **switchgear**
268 general term covering switching devices and their combination with associated control,
269 measuring, protective and regulating equipment, also assemblies of such devices and
270 equipment with associated interconnections, accessories, enclosures and supporting
271 structures, intended in principle for use in connection with generation, transmission, distribution
272 and conversion of electric energy

273 [SOURCE: IEC 60050-441:1984, 441-11-02, modified by deleting the first article]

274 **3.8**
275 **controlgear**
276 general term covering switching devices and their combination with associated control,
277 measuring, protective and regulating equipment, also assemblies of such devices and
278 equipment with associated interconnections, accessories, enclosures and supporting
279 structures, intended in principle for the control of electric energy consuming equipment

280 [SOURCE: IEC 60050-441:1984, 441-11-03, modified by deleting the first article]

281 **3.9**
282 **electrical accessory for fixed installation**
283 accessories and related systems intended for fixed electrical installations installed by instructed
284 or skilled persons and used by ordinary persons

285 Note 1 to entry: It includes in particular the following products:
286 - automatic reclosing devices
287 - circuit breakers for overcurrent protection
288 - Devices for the Connection of Luminaires (DCLs)
289 - devices mitigating the risk of fire due to the effect of arc fault currents
290 - devices protecting against electric shock
291 - electrical Energy Efficiency products
292 - HBES switches and related accessories for use in Home and Building Electronic Systems

293 **3.10**
294 **low-voltage switchgear and controlgear assembly**
295 **assembly**
296 combination of one or more low-voltage switching devices together with associated control,
297 measuring, signalling, protective, regulating equipment, with all the internal electrical and
298 mechanical interconnections and structural parts, as defined by the original manufacturer,
299 which can be assembled in accordance with the original manufacturer's instructions

300 [SOURCE: IEC 61439-1:2020]

301 **3.11**
302 **intelligent assembly**
303 assembly which includes facilities for intelligent operation and maintenance for the full life cycle
304 by using advanced sensor technology, digital technology, network technology, communication
305 technology and artificial intelligence technology

306 [SOURCE: IEC TS 63290:2023¹]

¹ Under preparation. Stage at the time of publication: IEC/ACD TS 63290:2020.

307

308 **3.12**309 **original manufacturer**

310 organization that has carried out the original design and the associated verification of an
311 assembly in accordance with the relevant assembly standard

312 [SOURCE: IEC 61439-1:2011, 3.10.1]

313 **3.13**314 **capability profile** <nearfield radiofrequency>

315 spectral envelope of electromagnetic radiated nearfield which an equipment is able to withstand
316 without degradation of its non-radio functions

317

318 **4 Implementation categories**

319 For the purpose of managing the update of the radiocommunication device of an equipment,
320 the following implementation categories are defined. They depend on whether the equipment
321 has electronic circuits and where the embedded software, called also firmware, if any,
322 supporting the non-radio functions of the equipment, is hosted.

323 The electronic circuit including the embedded software if any supporting the non-radio functions
324 of the host equipment can be either of:

325 a) Integrated fully or partially into the radiocommunication device or

326 b) Hosted only on the equipment, separately from the radiocommunication device or electronic
327 circuits without embedded software.

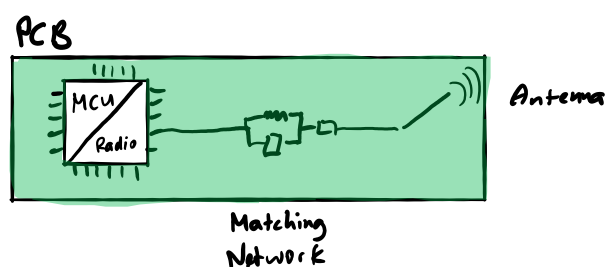
328 NOTE For the purpose of this document, the term "electronic circuit" excludes circuits in which all components are
329 passive (including diodes, resistors, varistors, capacitors, surge suppressors, inductors).

330 Five categories are defined as follows:

331 1) Category 0: Equipment composed of a host part without electronic circuits and a
332 radiocommunication device intended to monitor and transmit the contact position,
333 actuator position or similar signal.

334

335 2) Category 1: The radiocommunication device is hosting the embedded software of the
336 equipment (a)) including the radiocommunication functions as illustrated in Figure 1 and
337 Figure 2.



338

339 **Figure 1 – Example of radiocommunication implementation category 1**

340 Within the equipment, the embedded software can be distributed in several microcontroller
341 units (MCU) as shown in Figure 2. If one of them is also hosting the radiocommunication
342 capabilities, then the equipment falls in category 1.