



SLOVENSKI STANDARD
oSIST prEN 50131-2-4:2019

01-september-2019

Alarmni sistemi - Sistemi za javljanje vloma in ropa - 2-4. del: Zahteve za kombinirane pasivne infrardeče in mikrovalovne javljalnike

Alarm systems - Intrusion and hold-up systems - Part 2-4: Requirements for combined passive infrared and microwave detectors

Alarmanlagen - Einbruch- und Überfallmeldeanlagen - Teil 2-4: Anforderungen an Passiv-Infrarotdualmelder und Mikrowellenmelder

Systèmes d'alarme - Systèmes d'alarme contre l'intrusion et les hold-up - Partie 2-4: Exigences pour détecteurs combinés à infrarouges passifs et à hyperfréquences

Ta slovenski standard je istoveten z: prEN 50131-2-4:2019

ICS:

13.310	Varstvo pred kriminalom	Protection against crime
13.320	Alarmni in opozorilni sistemi	Alarm and warning systems

oSIST prEN 50131-2-4:2019

en,fr

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 50131-2-4

July 2019

ICS 13.310

Will supersede EN 50131-2-4:2008,
EN 50131-2-4:2008/IS1:2014

English Version

Alarm systems - Intrusion and hold-up systems - Part 2-4: Requirements for combined passive infrared and microwave detectors

Systèmes d'alarme - Systèmes d'alarme contre l'intrusion et
les hold-up - Partie 2-4: Exigences pour détecteurs
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Alarmanlagen - Einbruch- und Überfallmeldeanlagen - Teil
2-4: Anforderungen an Passiv-Infrarotdualmelder und
Mikrowellenmelder

This draft European Standard is submitted to CENELEC members for enquiry.
Deadline for CENELEC: 2019-09-27.

It has been drawn up by CLC/TC 79.

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.

This draft European Standard was established by CENELEC in three official versions (English, French, German).
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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

prEN 50131-2-4:2019 (E)

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<https://standards.iteh.ai/catalog/standards/sist/33388e20-75ad-4bec-ae99-ca00297284ba/sist-en-50131-2-4-2020>

prEN 50131-2-4:2019 (E)**48 European foreword**

49 This document [prEN 50131-2-4:2019] has been prepared by CLC/TC 79, "Alarm systems".

50 This document is currently submitted to the Enquiry.

51 The following dates are proposed:

- latest date by which the existence of this document has to be announced at national level (doa) dor + 6 months
- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) dor + 12 months
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) dor + 36 months (to be confirmed or modified when voting)

52 This document will supersede EN 50131-2-4:2008.

53 prEN 50131-2-4:2019 includes the following significant technical changes with respect to EN 50131-2-4:2008:

- 55 — editorial changes and refinement of wording;
- 56 — clarification to significant reduction of range requirements;
- 57 — clarification to the Electrical requirements section and certain environmental conditions;
- 58 — addition of requirements, tests and corresponding Annexes throughout the overall standard, to support ceiling mounted detectors;
- 59
- 60 — improvement of the requirements of the supplied documentation;
- 61 — improvement of the standard conditions for testing;
- 62 — addition of chapter which defines the condition for the mounting height while the tests are performed;
- 63
- 64 — refinement of the standard requirements for the Testing procedures;
- 65 — refinement of the Immunity to air flow test to allow for better repeatability of the test results;
- 66 — verifying and clarifying of the wording of the test for resistance to or detection of re-orientation of adjustable mountings;
- 67
- 68 — updating of the test magnet specification for resistance to magnetic field interference;
- 69 — verifying and clarifying of the wording for the detection of detector masking in regards to the conditions and the test material;
- 70
- 71 — review and optimization of the methods for temperature adjustments for the test environment;
- 72 — review of Sample Testmatrix;
- 73 — review and verifying of references to other standards.

- 74 EN 50131 will consist of the following parts, under the general title *Alarm systems - Intrusion and hold-*
75 *up systems*:
- 76 — *Part 1: System requirements*
 - 77 — *Part 2-2: Intrusion detectors – Passive infrared detectors*
 - 78 — *Part 2-3: Intrusion detectors – Microwave detectors*
 - 79 — *Part 2-4: Intrusion detectors – Combined passive infrared / Microwave detectors*
 - 80 — *Part 2-5: Intrusion detectors – Combined passive infrared / Ultrasonic detectors*
 - 81 — *Part 2-6: Intrusion detectors – Opening contacts*
 - 82 — *Part 2-7-1: Intrusion detectors – Glass break detectors – Acoustic*
 - 83 — *Part 2-7-2: Intrusion detectors – Glass break detectors – Passive*
 - 84 — *Part 2-7-3: Intrusion detectors – Glass break detectors – Active*
 - 85 — *Part 3: Control and indicating equipment*
 - 86 — *Part 4: Warning devices*
 - 87 — *Part 5-3: Requirements for interconnections equipment using radio frequency techniques*
 - 88 — *Part 6: Power supplies*
 - 89 — *Part 7: Application guidelines*
 - 90 — *Part 8: Security fog devices*

prEN 50131-2-4:2019 (E)**91 Introduction**

92 This document deals with combined passive infrared and microwave detectors (to be referred to as
93 the detector) used as part of intrusion alarm systems installed in buildings. It includes four security
94 grades and four environmental classes.

95 The purpose of the detector is to detect the broad spectrum infrared radiation emitted by an intruder,
96 to emit microwave signals and analyse the signals that are returned and to provide the necessary
97 range of signals or messages to be used by the rest of the intrusion alarm system.

98 The number and scope of these signals or messages will be more comprehensive for systems that are
99 specified at the higher grades.

100 This version of the standard contains limited requirements for grade 4 detectors. Future revisions of
101 the standard are expected to include enhanced requirements for grade 4 detectors.

102 This document is only concerned with the requirements and tests for the detector. Other types of
103 detector are covered by other documents identified as in the EN 50131-2 series.

104 NOTE Each country has certain regulations in regards to which part of the microwave spectrum is allowed to
105 be used in this application. This information can be found in ERC recommendation 70-03.

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106 1 Scope

107 This document is for combined passive infrared and microwave detectors installed in buildings and
108 provides for security Grades 1 to 4 (see EN 50131-1), specific or non-specific wired or wire-free
109 detectors, and uses environmental classes I to IV (see EN 50130-5). This document does not include
110 requirements for detectors intended for use outdoors.

111 The purpose of the detector is to detect the broad spectrum infrared radiation emitted by an intruder,
112 to emit microwave signals and analyse the signals that are returned and to provide the necessary
113 range of signals or messages to be used by the rest of the intrusion alarm system.

114 For a combined detector where both technologies have to be activated in order to generate an alarm
115 condition, providing higher false alarm immunity, it is essential to meet the grade dependent
116 requirements of this document.

117 For a combined detector which can be configured or operated such that each detection technology
118 can generate an alarm condition independently, it is essential to meet the grade-dependant
119 requirements of EN 50131-2-2 and EN 50131-2-3 when configured accordingly. Otherwise the
120 manufacturer clearly states that the detector does not comply to this document and not to EN 50131-
121 2-2 and EN 50131-2-3 when put into such a configuration.

122 It is essential that a detector fulfil all the requirements of the specified grade.

123 Functions additional to the mandatory functions specified in this document can be included in the
124 detector, providing they do not influence the correct operation of the mandatory functions.

125 This document does not apply to system interconnections.

126 2 Normative references

127 The following documents are referred to in the text in such a way that some or all of their content
128 constitutes requirements of this document. For dated references, only the edition cited applies. For
129 undated references, the latest edition of the referenced document (including any amendments)
130 applies. <https://standards.iteh.ai/catalog/standards/sist/33388e20-75ad-4bec-ae99->

131 EN 50130-4, *Alarm systems — Part 4: Electromagnetic compatibility — Product family standard: Immunity requirements for components of fire, intruder, hold up, CCTV, access control and social alarm systems*

134 EN 50130-5, *Alarm systems — Part 5: Environmental test methods*

135 EN 50131-1, *Alarm systems — Intrusion and hold-up systems — Part 1: System requirements*

136 EN 50131-6, *Alarm systems — Intrusion and hold-up systems — Part 6: Power supplies*

137 EN 60404-5, *Magnetic materials — Part 5: Permanent magnet (magnetically hard) materials — Methods of measurement of magnetic properties (IEC 60404-5)*

139 EN 60404-8-1, *Magnetic materials — Part 8-1: Specifications for individual materials — Magnetically hard materials (IEC 60404-8-1)*

141 EN 60404-14, *Magnetic materials — Part 14: Methods of measurement of the magnetic dipole moment of a ferromagnetic material specimen by the withdrawal or rotation method (IEC 60404-14)*

prEN 50131-2-4:2019 (E)**143 3 Terms, definitions and abbreviations**

144 For the purposes of this document, the terms, definitions and abbreviations given in EN 50131-1 and
145 the following apply.

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

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

149 3.1 Terms and definitions**150 3.1.1****151 activated state**

152 condition where a detection technology participates in the generation of an alarm signal or message

153 3.1.2**154 basic detection target**

155 heat source and/or microwave reflector designed to verify the operation of a detector

156 3.1.3**157 coverage angle**

158 width of field of view in degrees provided by the detector when measured in the horizontal plane

159 3.1.4**160 combined passive infrared and microwave detector**

161 detector of the broad-spectrum infrared emitted by a human being, with an active microwave emitter
162 and detector installed in the same casing

163 3.1.5**164 detection settings**

165 adjustments which influence the performance of the detector (e.g. pulse count settings, gain settings)

166 3.1.6**167 detector reference axis**

168 virtual line determined by the detector manufacturer projecting from the point of origin of the detection
169 coverage pattern.

170 3.1.7**171 incorrect operation**

172 physical condition that causes an inappropriate signal from a detector in the context of this standard

173 3.1.8**174 masking**

175 interference with the detector input capability by the introduction of a physical barrier such as metal,
176 plastic, paper or sprayed paints or lacquers in close proximity to the detector

177 3.1.9**178 microwave detector**

179 detector having an active microwave emitter and receiver installed in the same casing

180 3.1.10**181 passive infrared detector**

182 detector of broad-spectrum infrared radiation

183 3.1.11**184 simulated walk test target**

185 non-human or synthetic heat source or microwave reflector designed to simulate the standard walk
186 test target

187 **3.1.12**
 188 **standard walk test target**
 189 human being of standard weight and height clothed in close fitting clothing appropriate to the
 190 simulation of an intruder

191 **3.1.13**
 192 **walk test**
 193 operational test during which a detector is stimulated by the standard walk test target in a controlled
 194 environment

195 **3.1.14**
 196 **walk test attitude, crawling**
 197 orientation of the standard walk test target moving with hands and knees in contact with the floor

198 **3.1.15**
 199 **walk test attitude, upright**
 200 orientation of the standard walk test target standing and walking with arms held at the sides of the
 201 body

202 **3.2 Abbreviations**

- HDPE High Density PolyEthylene
- PIR Passive InfraRed
- EMC Electromagnetic Compatibility
- SWT Standard Walk-test Target
- BDT Basic Detection Target
- FOV Field Of View

203 **4 Functional requirements**

204 **4.1 Event Processing**

205 Detectors shall process the events shown in Table 1.

206 **Table 1 — Events to be processed by grade**

Event	Grade			
	1	2	3	4
Intrusion Detection	M	M	M	M
Tamper Detection	Op	M	M	M
Masking Detection	Op	Op	M	M
Low Supply Voltage	Op	Op	M	M
Total Loss of Power Supply	Op	M	M	M
Local Self-Test	Op	Op	M	M
Remote Self-Test	Op	Op	Op	M
M = Mandatory Op = Optional				

207 Detectors shall generate signals or messages as shown in Table 2.

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208

Table 2 — Generation of Signals or Messages

Event	Signals or Messages		
	Intrusion	Tamper	Fault
No Event	NP	NP	NP
Intrusion	M	NP	NP
Tamper	NP	M	NP
Masking ^a	M	Op	M
Low Supply Voltage	Op	Op	M
Total Loss of Power Supply ^b	M	Op	Op
Local Self-Test Pass	NP	NP	NP
Local Self-Test Fail	NP	NP	M
Remote Self-Test Pass	M	NP	NP
Remote Self-Test Fail	NP	NP	M
M = Mandatory NP = Not Permitted Op = Optional			
This permits two methods of signalling a masking: either by the intrusion signal and fault signal, or by a dedicated masking or message. Use of the intrusion signal and fault signal is preferable, as this requires fewer connections between CIE and detector. If multiple events overlap there will be some signal combinations that may be ambiguous. To overcome this ambiguity it is suggested that detectors should not signal 'intrusion' and 'fault' at the same time except to indicate masking. This implies that the detector should prioritize signals, e.g. 1 Intrusion, 2 Fault, 3 Masking.			
When, in Table 1, an event may optionally generate signals or messages, they shall be as shown in this table.			
^a An independent signal or message may be provided instead.			
^b Alternatively Total loss of Power Supply shall be determined by loss of communication with the detector.			

209 **4.2 Detection**210 **4.2.1 Detection performance**

211 Both detection technologies shall be in an activated state, before the alarm condition shall be signalled
212 or messaged.

213 The detector shall generate an intrusion signal or message when the standard or simulated walk-test
214 target moves at velocities and attitudes specified in Table 3. For detection across the boundary the
215 walk-test distance shall be 1,5 m either side of the boundary. For test "Detection within the boundary"
216 the walk-test distance shall be 3,0 m.

217

Table 3 — General walk test velocity and attitude requirements

Test	Grade 1	Grade 2	Grade 3	Grade 4
Detection across the boundary	Required	Required	Required	Required
Velocity	1,0 ms ⁻¹	1,0 ms ⁻¹	1,0 ms ⁻¹	1,0 ms ⁻¹
Attitude	Upright	Upright	Upright	Upright
Detection within the boundary	Required	Required	Required	Required
Velocity	0,3 ms ⁻¹	0,3 ms ⁻¹	0,2 ms ⁻¹	0,1 ms ⁻¹
Attitude	Upright	Upright	Upright	Upright
Detection at high velocity	Not required	Required	Required	Required
Velocity	N/A	2,0 ms ⁻¹	2,5 ms ⁻¹	3,0 ms ⁻¹
Attitude	N/A	Upright	Upright	Upright
Close-in detection performance (For coverage angles less than or equal to 180°)	Required	Required	Required	Required
Distance	2,0 m	2,0 m	0,5 m	0,5 m
Velocity	0,5 ms ⁻¹	0,4 ms ⁻¹	0,3 ms ⁻¹	0,2 ms ⁻¹
Attitude	Upright	Upright	Crawling	Crawling
Detection of radial movement (For coverage angles of 360°)	Required	Required	Required	Required
Velocity	0,5 ms ⁻¹	0,4 ms ⁻¹	0,3 ms ⁻¹	0,2 ms ⁻¹
Attitude	Upright	Upright	Upright	Upright
Intermittent movement detection performance ^a	Not required	Not required	Required	Required
Velocity	N/A	N/A	1,0 ms ⁻¹	1,0 ms ⁻¹
Attitude	N/A	N/A	Upright	Upright
^a For Grade 3 and 4 detectors, the intermittent movement shall consist of the SWT walking 1 m at a velocity of 1,0 ms ⁻¹ then pausing for 5 s before continuing. The sequence shall be maintained until the SWT has traversed through the entire detection area. This constitutes one walk test. The test shall be repeated in each of the directions shown in Figure C.3.				

218 The detection performance tests required for a detector will depend on the coverage angle claimed.
 219 Therefore this standard differentiates between detectors with coverage angles less than or equal to
 220 180°, such as those typically used for wall mounted applications, and detectors with coverage angles
 221 of 360° detectors intended for ceiling mounting.

222 4.2.2 Indication of detection

223 An indicator shall be provided at the detector to indicate when an intrusion signal or message has
 224 been generated. At Grades 1 and 2 this indicator shall be capable of being enabled and disabled
 225 either remotely at Access Level 2 and/or locally after removal of a cover which provides tamper
 226 detection as described in Tables 1 and 4. At Grades 3 and 4 this indicator shall be capable of being
 227 enabled and disabled remotely at Access Level 2.

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228 **4.3 Operational requirements**229 **4.3.1 Time interval between intrusion signals or messages**

230 Detectors using wired interconnections shall be able to provide an intrusion signal or message not
231 more than 15 s after the end of the preceding intrusion signal or message.

232 Detectors using wire free interconnections shall be able to provide an intrusion signal or message after
233 the end of the preceding intrusion signal or message within the following times:

Grade 1	300 s
Grade 2	180 s
Grade 3	30 s
Grade 4	15 s

234 **4.3.2 Switch on delay**

235 The detector shall meet all functional requirements within 180 s of the power supply reaching its
236 nominal voltage as specified by the manufacturer.

237 **4.3.3 Self-tests**238 **4.3.3.1 General**

239 Self-tests shall detect failures of a critical function (e.g. unable to detect temperature differences) and
240 signal these situations according to Table 2.

241 **4.3.3.2 Local Self-Test**

242 The detector shall automatically test itself at least once every 24 h according to the requirements of
243 Tables 1 and 2. If normal operation of the detector is inhibited during a local self-test, the detector
244 inhibition time shall be limited to a maximum of 30 s in any period of 2 h.

245 **4.3.3.3 Remote Self-Test**

246 A detector shall process remote self-tests and generate signals or messages in accordance with
247 Tables 1 and 2 within 10 s of the remote self-test signal being received, and shall return to normal
248 operation within 30 s of the remote test signal being received.

249 **4.4 Immunity of the individual technologies to incorrect operation**250 **4.4.1 General**

251 The detector shall be considered to have sufficient immunity to incorrect operation if the following
252 requirements have been met. No intrusion signal or message shall be generated during the tests.

253 **4.4.2 Immunity to turbulent warm air flow**

254 The PIR component of the detector shall not initiate the generation of any signals or messages when
255 turbulent warm air is blown over the face of the detector.

256 **4.4.3 Immunity to visible & near infrared radiation**

257 The PIR component of the detector shall not initiate the generation of any signals or messages when a
258 beam of visible light is swept across the front window or lens through two panes of glass.

259 **4.4.4 Immunity to microwave signal interference by fluorescent lights**

260 The microwave component of the detector shall not initiate the generation of any signals or messages
261 due to the operation of a fluorescent light source mounted nearby.

262 **4.5 Tamper security**263 **4.5.1 General**

264 Tamper security requirements for each grade of detector are shown in Table 4.

265 **Table 4 — Tamper security requirements**

Requirement	Grade 1	Grade 2	Grade 3	Grade 4
Resistance to access to the inside of the detector	Required	Required	Required	Required
Detection of access to the inside of the detector	Not Required	Required	Required	Required
Removal from the mounting surface wired detectors	Not required	Not Required	Required	Required
Removal from the mounting surface wirefree detectors	Not required	Required	Required	Required
Resistance to, or detection of, re-orientation Applied torque	Not required	Required 2 Nm	Required 5 Nm	Required 10 Nm
Magnetic field immunity Magnet Type defined in Annex A	Not required	Required Type 1	Required Type 2	Required Type 2
Masking Detection	Not required	Not required	Required	Required

266 **4.5.2 Resistance to and detection of unauthorised access to components and means of adjustment**
267

268 All components, means of adjustment and access to mounting screws, which, when interfered with,
269 could adversely affect the operation of the detector, shall be located within the detector housing. Such
270 access shall require the use of an appropriate tool and depending on the grade as specified in Table 4
271 shall generate a tamper signal or message before access can be gained.

272 It shall not be possible to gain such access without generating a tamper signal or message or causing
273 visible damage.

274 **4.5.3 Detection of removal from the mounting surface**

275 A tamper signal or message shall be generated if the detector is removed from its mounting surface
276 for each claimed mounting type (e.g. wall, ceiling, corner, brackets) in accordance with Table 4.

277 The tamper detection mechanism shall not be defeated by the use of small tools as per the examples
278 in Annex I.

279 **4.5.4 Resistance to, or detection of, re-orientation**

280 Detectors mounted on adjustable mountings, shall resist or detect reorientation.

281 After the torque given in Table 4 has been applied and then removed from the detector it shall not
282 have rotated more than 5° from its original position. Alternatively, when the torque given in Table 4 has
283 been applied, a tamper signal or message shall be generated if the detector rotates by more than 5°.

284 **4.5.5 Immunity to magnetic field interference**

285 It shall not be possible to inhibit any signal or message with a magnet of grade dependence according
286 to Table 4. The magnet types shall be as described in Annex A.