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

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

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To be completed

This draft European Standard is submitted to CENELEC members for enquiry.
Deadline for CENELEC: 2021-04-02.

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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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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European foreword

This document (prEN 50131-2-2:2021) has been prepared by CLC/TC 79, “Alarm systems”.

This document is currently submitted to the Enquiry.

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• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	dor + 36 months (to be confirmed or modified when voting)

This document will supersede EN 50131-2-2:2017 and all of its amendments and corrigenda (if any).

prEN 50131-2-2:2021 includes the following significant technical changes with respect to EN 50131-2-2:2017:

— editorial changes and refinement of wording;

— removal of significant reduction of range requirements;

— addition of requirements, tests and corresponding Annexes throughout the overall standard, to support ceiling mounted detectors;

EN 50131 will consist of the following parts, under the general title *Alarm systems - Intrusion and hold-up systems*:

— *Part 1: System requirements*

— *Part 2–2: Intrusion detectors – Passive infrared detectors*

— *Part 2–3: Intrusion detectors – Microwave detectors*

— *Part 2–4: Intrusion detectors – Combined passive infrared / Microwave detectors*

— *Part 2–5: Intrusion detectors – Combined passive infrared / Ultrasonic detectors*

— *Part 2–6: Intrusion detectors – Opening contacts*

— *Part 2–7–1: Intrusion detectors – Glass break detectors – Acoustic*

— *Part 2–7–2: Intrusion detectors – Glass break detectors – Passive*

— *Part 2–7–3: Intrusion detectors – Glass break detectors – Active*

— *Part 3: Control and indicating equipment*

— *Part 4: Warning devices*

— *Part 5–3: Requirements for interconnections equipment using radio frequency techniques*

— *Part 6: Power supplies*

— *Part 7: Application guidelines*

— *Part 8: Security fog devices*

Introduction

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

The purpose of the detector is to detect the broad spectrum infrared radiation emitted by an intruder, to analyse the resulting signals and to provide the necessary range of signals or messages to be used by the rest of the intrusion alarm system.

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

This version of the document contains limited requirements for Grade 4 detectors. Future revisions of the document are expected to include enhanced requirements for Grade 4 detectors.

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

1 Scope

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

The purpose of the detector is to detect the broad spectrum infrared radiation emitted by an intruder, to analyse the resulting signals and to provide the necessary range of signals or messages to be used by the rest of the intrusion alarm system.

The grade-dependent requirements of this document apply and it is essential that a detector fulfils all the requirements of the specified grade.

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

Requirements for system interconnections are not included in this document.

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.

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*

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

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

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

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

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)*

3 Terms, definitions and abbreviations

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

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

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1 Terms and definitions

3.1.1
basic detection target
heat source designed to verify the operation of a detector

3.1.2
coverage angle
width of field of view in degrees provided by the detector when measured in the horizontal plane

205 **3.1.3**
206 **detection settings**
207 adjustments which influence the performance of the detector

208 EXAMPLE: pulse count settings, gain settings

209 **3.1.4**
210 **detector reference axis**
211 virtual line determined by the detector manufacturer projecting from the point of origin of the detection
212 coverage pattern

213 **3.1.5**
214 **incorrect operation**
215 physical condition that causes an inappropriate signal from a detector in the context of this document

216 **3.1.6**
217 **masking**
218 interference with the ability to detect human intruders by the introduction of a physical obstruction such
219 as metal, plastic, paper or sprayed paints or lacquers on or in close proximity to the detector

220 **3.1.7**
221 **passive infrared detector**
222 device used to determine the presence of human intruders by sensing the broad-spectrum infrared
223 emitted by a human being

224 **3.1.8**
225 **simulated walk test target**
226 non-human or synthetic heat source designed to simulate the standard walk test target

227 **3.1.9**
228 **standard walk test target**
229 human being of defined weight and height clothed in close fitting garments

230 **3.1.10**
231 **walk test**
232 operational test to demonstrate detection performance during which a detector is stimulated by the
233 standard walk test target in a controlled environment

234 **3.1.11**
235 **walk test attitude, crawling**
236 orientation of the standard walk test target moving with hands and knees in contact with the floor

237 **3.1.12**
238 **walk test attitude, upright**
239 orientation of the standard walk test target standing and walking with arms held at the sides of the body

240 ## 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

4 Functional requirements

4.1 Event Processing

Detectors shall process the events shown in Table 1.

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				

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

246 **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 [a]	NP	NP	NP
Local Self-Test Fail	NP	NP	M
Remote Self-Test Pass [a]	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 could 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] Total loss of Power Supply does not apply for message based detectors.			

247 ## 4.2 Detection

248 ### 4.2.1 Detection performance

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

253 **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.
The detector shall provide an intrusion signal or message either during the walk test or within 10 s of its completion

254 The detection performance tests required for a detector will depend on the coverage angle claimed.
255 Therefore this document differentiates between detectors with coverage angles less than or equal to
256 180°, such as those typically used for wall mounted applications, and detectors with coverage angles of
257 360° detectors intended for ceiling mounting.

258 **4.2.2 Indication of detection**

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

4.3 Operational requirements

4.3.1 Time interval between intrusion signals or messages

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

Detectors using wire free interconnections shall be able to provide an intrusion signal or message after 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

4.3.2 Switch on delay

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

4.3.3 Self-tests

4.3.3.1 General

Self-tests shall detect failures of a critical function (e.g. unable to detect temperature differences) and signal these situations according to Table 2. As a minimum the self-tests shall detect failures of the output of the sensing technology.

4.3.3.2 Local Self-Test

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

4.3.3.3 Remote Self-Test

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

4.4 Immunity to incorrect operation

4.4.1 General

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

4.4.2 Immunity to turbulent warm air flow

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

4.4.3 Immunity to visible and near infrared radiation

The detector shall not generate any signals or messages when a beam of visible light is swept across the front window or lens through two panes of glass.

4.5 Tamper security

4.5.1 General

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

299 **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

300 **4.5.2 Resistance to and detection of unauthorised access to components and means of**
301 **adjustment**

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

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

308 **4.5.3 Detection of removal from the mounting surface**

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

311 The tamper detection mechanism shall not be defeated by the use of small tools as per the examples
312 in Annex H.

313 **4.5.4 Resistance to, or detection of, re-orientation**

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

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

318 **4.5.5 Immunity to magnetic field interference**

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

321 **4.5.6 Detection of masking**

322 Means shall be provided to detect inhibition of the operation of the detector by masking according to the
323 requirements of Table 4.

324 The maximum response time for the masking detection device shall be 180 s. Masking shall be signalled
325 according to the requirements of Table 2. The signals or messages shall remain for at least as long as
326 the masking condition is present. A masking signal or message shall not be reset while the masking
327 condition is still present. Alternatively, the masking signal or message shall be generated again within
328 180 s of being reset if the masking condition is still present.