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CENELEC

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Foreword

This document (CLC/TS 50131-2-8:2012) has been prepared by CLC/TC 79 "Alarm systems".

This document was circulated for voting in accordance with the Internal Regulations, Part 2, Subclause 11.3.3.3.

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Introduction

This document is a Technical Specification for shock detectors used as part of intrusion alarm systems installed in buildings. It includes four security grades and four environmental classes.

The purpose of a shock detector is to detect the shock or series of shocks due to a forcible attack through a physical barrier (for example doors or windows) and provide the necessary range of signals or messages to be used by the rest of the intrusion and hold-up 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 Technical Specification is only concerned with the requirements and tests for the shock detectors.

1 Scope

This Technical Specification is for shock detectors installed in buildings to detect the shock or series of shocks due to a forcible attack through a physical barrier (for example doors or windows).

It provides for security Grades 1-4 (see EN 50131-1), specific or non specific wired or wire-free detectors and uses Environmental Classes i-iv (see EN 50130-5).

This Technical Specification does not include requirements for detectors intended to protect for example vaults and safes from penetration attacks from e.g. drilling, cutting or thermal lance.

This Technical Specification does not include requirements for shock detectors intended for use outdoors.

A detector shall fulfil all the requirements of the specified grade.

Functions additional to the mandatory functions specified in this Technical Specification may be included in the detector, providing they do not adversely influence the correct operation of the mandatory functions.

This Technical Specification does not apply to system interconnections.

2 Normative references

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

EN 50130-4:2011, *Alarm systems — Part 4: Electromagnetic compatibility — Product family standard: Immunity requirements for components of fire, intruder and social alarm systems*

EN 50130-5:2011, *Alarm systems — Part 5: Environmental test methods*

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

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

EN 60068-1:1994, *Environmental testing — Part 1: General and guidance (IEC 60068-1:1988 + A1:1992 + corrigendum Oct. 1988)*

EN 60068-2-75:1997, *Environmental testing — Part 2-75: Tests — Test Eh: Hammer tests (IEC 60068-2-75:1997)*

IEC 68-2-52:1984, *Environmental testing — Part 2: Tests — Test Kb: Salt mist, cyclic (sodium, chloride solution)*

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.

3.1 Terms and definitions

3.1.1
shock
sudden transient acceleration or deceleration e.g. caused by a mechanical impact as a result of a forcible attack through a physical barrier

3.1.2
incorrect operation
physical condition that causes an inappropriate signal or message from a shock detector

3.1.3
masking
interference with the shock detector input capability, which prohibits the triggering of the shock detector (e.g. disabling the detector with an external magnet)

3.1.4
shock test
operational test, during which a shock detector is activated by using the standard triggering method in a controlled environment

3.1.5
shock detector
combination of one or more shock sensor(s) and an analyser, which provides signalling or messaging to the Intruder & Hold Up alarm system

3.1.6
shock sensor
element which detects the mechanical shock energy and produces a signal for further analysing

3.1.7
analyser
physical unit or processing capabilities used to process the signal(s) produced by one or more shock sensor(s) and provides a signal or message to the intruder & Hold Up alarm system

3.1.8
mass inertia
physical underlying principle which will be used for sensing a shock e.g. a weighted or piezo transducer sensor

3.1.9
gross attack
large single shock due to a impact on the supervised material, e.g. impact generated by a sledge hammer on a concrete surface

3.1.10
low shock integration attack
series of low level shocks, due to a number of impacts on the supervised material integrating over a certain time, e.g. impacts generated by chiselling on a concrete surface

3.1.11
standard immunity window
framed window, which will be used for all immunity tests, where a framed window is required, according to Annex D.

3.2 Abbreviations

CIE Control & Indicating Equipment

EMC Electro Magnetic Compatibility

4 Functional requirements

4.1 General

A shock detector consists of a shock sensor and an analyser, which may either be in the same housing, or in separate housing. Furthermore the analyser can be integrated into another component of the Intruder & Hold Up alarm system (for example the CIE).

4.2 Event Processing

Shock detectors shall process the events shown in Table 1. Shock detectors shall generate signals or messages as shown in Table 2.

Table 1 – Events to be processed by grade

Event	Grade			
	1	2	3	4
Intrusion	M	M	M	M
Tamper Detection	Op	M	M	M
Masking Detection				
Magnetic Masking	Op	Op	M	M
Detection of penetration of sensor housing	Op	Op	Op	M
Removal from the mounting surface [a]	Op	Op	M	M
Low Supply Voltage – wire free devices	M	M	M	M
Low Supply Voltage – wired devices	Op	Op	Op	M
Total Loss of Power Supply [b]	Op	M	M	M
Local Self Test [c]	Op	Op	Op	M
Remote Self Test [c]	Op	Op	Op	M

Key
M = Mandatory, Op = Optional

[a] Mandatory for wire-free at grades 2, 3 and 4; mandatory for all surface mounted grade 3 and 4 types, optional for wired surface mounted grades 1 and 2. Not required for wired, concealed flush mounted types grade 3.

[b] Mandatory for wire-free at all grades. Only required if power is for normal local operation, e.g. purely switch based solutions do not fall under this requirement; however if signal processing (except if it is the CIE itself) is required to process the output of the sensor, such an event shall be generated. No generation of a message or signal is required when the condition is detected by the CIE due to system design, e.g. bus based systems.

[c] Only required if signal processing is used to generate any signal or message, e.g. purely mechanical based solutions do not fall under this requirement. No generation of a message or signal is required when the condition is detected by the CIE due to system design, e.g. bus based systems.

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*	M	Op	M
Removal from the mounting surface	NP	M	NP
Low Supply Voltage	Op	Op	M
Total Loss of Power Supply**	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

Key
M = Mandatory

NP = Not Permitted

Op = Optional

* An independent signal or message may be provided instead.

NOTE 1 This permits two methods of signalling a masking event: either by the intrusion signal and fault signal, or by a dedicated masking signal or message. Use of the intrusion signal and fault signal is preferable, as this requires fewer connections between CIE and shock detector. If multiple events overlap there will be some signal combinations that may be ambiguous. To overcome this ambiguity it is suggested that shock detectors should not signal 'intrusion' and 'fault' at the same time except to indicate masking. This implies that the shock detector should prioritise signals, e.g. 1 Intrusion, 2 Fault, 3 Masking.

** Alternatively Total loss of Power Supply shall be determined by loss of communication with the shock detector.

NOTE 2 When, in Table 1, an event may optionally generate signals or messages, they shall be as shown in this table.

NOTE 3 It is accepted that a bus system may send out dedicated signals or messages and does not necessarily have to follow the mapping of Table 2, provided that all of the required events are signalled.

4.3 Detection

4.3.1 Detection performance

4.3.1.1 Generalities

The shock detector shall be designed to distinguish between environmental shocks and shocks resulting from a physical attack which may be intended to penetrate the structure. The means for achieving this may be adjustable to suit varying circumstances.

The operating parameters of the shock detector shall be verified as specified by the manufacturer.

The manufacturer shall clearly state in the product documentation, any special limitation concerning installation e.g. area of coverage etc.

The shock detector shall generate an intrusion signal or message when a simulated structure penetration is performed at all grades.

4.3.1.2 Verification of gross attack detection performance

This test will verify the detection performance for sensitivity and area of coverage, according to the supported conditions claimed by the manufacturer for a gross attack.

There are minimum performance requirements for gross attack detection which need to be fulfilled by the shock detector according to Table G.1.

Furthermore, the manufacturer can specify other performance requirements, which need to be verified by testing against the performance specifications provided by the manufacturer.

The manufacturer shall specify the lowest and the highest detection level of the supported area of coverage on a specified material for an impact defined at a certain energy level according to Table G.1. Each of the specified lowest and highest detection levels will be tested.

4.3.1.3 Verification of low shock integration attack detection performance

This test will verify the detection performance for sensitivity and area of coverage according to the supported conditions claimed by the manufacturer for a low shock integration attack.

This test only applies, if the manufacturer claims his product supports this feature

There are minimum performance requirements for low shock integration attack detection which need to be fulfilled by the shock detector according to Table G.1.

Furthermore, the manufacturer can specify other performance requirements, which will be verified by testing against the performance specifications provided by the manufacturer.

The manufacturer shall specify the lowest and the highest detection level of the supported area of coverage on a specified material for an impact defined at a certain energy level as specified in Table G.1. Each of the specified lowest and highest detection levels will be tested.

4.3.2 Indication of detection

Powered shock detectors at Grades 3 and 4 that include processing capabilities shall provide an indicator at the detector to indicate when an intrusion signal or message has been generated. Self-powered shock detectors (e.g. detectors which rely on the energy resulting from the impact or a series of impacts) do not require such an indicator.

At Grades 3 and 4 this indicator shall be capable of being enabled and disabled remotely at Access Level 2.

4.4 Immunity to false alarm sources

4.4.1 General

The detector shall have sufficient immunity to false alarm sources if the following requirements have been met:

No intrusion signal or message shall be generated as a result of the false alarm sources according to each individual test clause.

If not defined in the individual test section differently, for this clause the tests will be performed on the standard immunity test window as defined in 3.1.10, wherever a monitored object is required.

4.4.2 Immunity to Small objects hitting a framed window

The detector shall not generate an intrusion signal or message when small objects such as hail, sand, gravel etc. hit the outside of the monitored surface, when set to the chosen sensitivity level required to pass the gross attack detection performance test. The tests are described in 6.7.2.

4.4.3 Immunity to Hard objects hitting a framed window

The detector shall not generate an intrusion signal or message when hard objects (e.g. handlebars of a bicycle) hit the outside of the monitored surface, when set to the chosen sensitivity level required to pass the gross attack detection performance test. The tests are described in 6.7.3.

4.4.4 Immunity to Static pressure

The detector shall not generate an intrusion signal or message when permanent pressure changes applied to the monitored surface, when set to the chosen sensitivity level required to pass the gross attack detection performance test. The tests are described in 6.7.4.

4.4.5 Immunity to Dynamic pressure

The detector shall not generate an intrusion signal or message when dynamic pressure changes (due to wind, etc.) applied to the monitored surface, when set to the chosen sensitivity level required to pass the gross attack detection performance test. The tests are described in 6.7.5.

4.4.6 Standard Immunity Test

The detector shall not generate an intrusion signal or message when for each standard installation material (glass plate, wooden plate & concrete plate as defined in Annex A), a minimum force will be issued at a given distance from the detector, when set to the chosen sensitivity level required to pass the gross attack detection performance test. The tests are described in 6.7.6.

4.5 Operational requirements

4.5.1 Time interval between intrusion signals or messages

Shock 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.

Shock 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

4.5.2 Switch on delay

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

4.5.3 Self tests

4.5.3.1 Local Self Test

The shock 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 shock detector is inhibited during a local self-test, the shock detector inhibition time shall be limited to a maximum of 30 s in any period of 2 h.

4.5.3.2 Remote Self Test

A shock 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

4.6 Tamper security

4.6.1 General

Tamper security requirements for each grade of shock detector and / or the individual components it consists of as shown in Table 3.

Table 3 –Tamper security requirements

Requirement	Grade 1	Grade 2	Grade 3	Grade 4
Resistance to access to the inside of the shock detector	Required	Required	Required	Required
Detection of access to the inside of the shock detector	Not Required	Required	Required	Required
Detection of removal from the mounting surface - wired shock detector	Not Required	Not Required	Required	Required
Detection of removal from the mounting surface - wirefree shock detector	Not Required	Required	Required	Required
Resistance to magnetic field interference	Not required	Required	Required	Required
Magnet Type defined in Annex B	X	Type 1	Type 2	Type 2
Detection of Masking	Not Required	Not Required	Required	Required
Detection of magnetic Masking Magnet Type defined in Annex B	X	X	Type 2	Type 2
Detection of penetration of housing containing the sensor element	X	X	X	Required

4.6.2 Resistance to and detection of unauthorised access to components and means of adjustment

All components, means of adjustment and access to mounting screws, which, when interfered with, could adversely affect the operation of the shock detector, shall be located within the shock detector or each individual component the shock detector consists of. Such access shall require the use of an appropriate tool and depending on the grade as specified in Table 3, shall generate a tamper signal or message before access can be gained.

It shall not be possible to gain such access without generating a tamper signal or message or causing visible damage. Sealed detectors do not require the means to detect access to the inside of the detector, as long as access to any adjustments is not possible or generates a tamper signal or message before access can be gained.

4.6.3 Detection of removal from the mounting surface

A tamper signal or message shall be generated if the shock sensor is removed from its mounting surface, in accordance with Table 3.

4.6.4 Resistance to magnetic field interference

It shall not be possible to inhibit any signals or messages with a magnet of grade dependence according to Table 3.

4.6.5 Detection of masking

Means shall be provided to detect inhibition of the operation of the shock sensor by masking according to the requirements of Table 3. For grade 3 products it is allowed that the detector is immune to a masking condition and operates within the normal boundaries as specified by the manufacturer.

There are different potential ways of masking a shock sensor. Therefore two different tests will be performed dependent on grade.

The first masking test will be to immobilise the active sensor component of a shock sensor with a magnetic field in a position, where it is no longer able to detect gross attacks and/or low shock integration attacks.

The second masking test will verify the ability of the shock sensor housing to detect the unauthorized access to prevent the fixing of the active sensor component of a shock sensor e.g. via a screw or superglue.

NOTE 1 In an I&HAS, any masked shock sensor should prevent setting of the system, as long as it is not immune to the masking condition.

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

NOTE 2 From a system design point of view, it would be preferable for masked shock sensors and/or detectors to automatically reset after the masking condition is removed.

For shock detectors where detection of masking may be remotely disabled, the detection of masking shall operate when the I&HAS is unset; it is not required to operate when the I&HAS is set.

4.7 Electrical requirements

4.7.1 General

The grade dependencies appear in Table 4. These requirements do not apply to shock detectors having Type C power supplies. For these shock detectors refer to EN 50131-6.

Table 4 – Electrical requirements

Test	Grade 1	Grade 2	Grade 3	Grade 4
Shock detector current consumption	Required	Required	Required	Required
Input voltage range	Required	Required	Required	Required
Slow input voltage rise	Not required	Required	Required	Required
Input voltage ripple	Not required	Required	Required	Required
Input voltage step change	Not required	Required	Required	Required

4.7.2 Shock detectors current consumption

The shock detectors or its individual components (sensor and/or analyser), when applicable, quiescent and maximum current consumption shall not exceed the figures claimed by the manufacturer at the nominal input voltage.

4.7.3 Slow input voltage change and voltage range limits

The shock detectors or its individual components (sensor and/or analyser), when applicable, shall meet all functional requirements when the input voltage lies between ± 25 % of the nominal value, or between the manufacturer's stated values if greater. When the supply voltage is raised slowly, the shock detectors or its individual components (sensor and/or analyser), when applicable, shall function normally at the specified range limits.

4.7.4 Input voltage ripple

The shock detectors or its individual components (sensor and/or analyser), when applicable, shall meet all functional requirements during the sinusoidal variation of the input voltage by ± 10 % of nominal, at a frequency of 100 Hz.

4.7.5 Input voltage step change

No signals or messages shall be caused by a step in the input voltage between nominal and maximum and between nominal and minimum.

4.8 Environmental classification and conditions

4.8.1 Environmental classification

The environmental classification is described in EN 50131-1 and shall be specified by the manufacturer.

4.8.2 Immunity to environmental conditions

Shock detectors or its individual components (sensor and/or analyser), when applicable, shall meet the requirements of the environmental tests described in Tables 5 and 6. These tests shall be performed in accordance with EN 50130-5 and EN 50130-4.

Unless specified otherwise for operational tests, the shock detectors or its individual components (sensor and/or analyser), when applicable, shall not generate unintentional intrusion, tamper, fault or other signals or messages when subjected to the specified range of environmental conditions.

Impact tests shall not be carried out on delicate shock detector components such as LEDs, optical windows or lenses.

For endurance tests, the shock detector or its individual components (sensor and/or analyser), when applicable, shall continue to meet the requirements of this specification after being subjected to the specified range of environmental conditions.

5 Marking, identification and documentation

5.1 Marking and/or identification

Marking and/or identification shall be applied to the product in accordance with the requirements of EN 50131-1.

5.2 Documentation

The product shall be accompanied with clear and concise documentation conforming to the main systems document EN 50131-1. The documentation shall additionally state:

a) a list of all options, functions, inputs, signals or messages, indications and their relevant characteristics;

b) the manufacturer's diagram of the shock detector and its claimed detection areas for the minimum and maximum sensitivity levels based on the material of the supervised structure;

c) the recommended mounting position, and the effect of changes to it on the claimed detection area;

d) the effect of adjustable controls on the shock detector performance or on the claimed detection boundary and sensitivity levels including at least the minimum and maximum settings;

e) any disallowed field adjustable control settings or combinations of these;

f) any specific settings needed to meet the requirements of this specification at the claimed grade;

g) where sensitivity adjustments are provided, these shall be labelled as to their function;

h) the manufacturer's quoted nominal operating voltage, and the maximum and quiescent current consumption at that voltage.

6 Testing

6.1 General

The tests are intended to be primarily concerned with verifying the correct operation of the shock detector to the specification provided by the manufacturer. All the test parameters specified shall carry a general tolerance of ± 10 % unless otherwise stated. A list of tests appears as a general test matrix in Annex C.

6.2 General test conditions

6.2.1 Standard conditions for testing

The general atmospheric conditions in the measurement and tests laboratory shall be those specified in EN 60068-1:1994, subclause 5.3.1, unless stated otherwise.

Temperature	15 °C to 35 °C
Relative humidity	25 % RH to 75 % RH
Air pressure	86 kPa to 106 kPa

6.2.2 General detection testing environment and procedures

6.2.2.1 General

Manufacturer's documented instructions regarding mounting and operation shall be read and applied to all tests.

6.2.2.2 Testing environment

The detectors sensor elements will be mounted according to the manufacturer's description on the monitored object (e.g. glass window, concrete wall or door).

6.2.2.3 Test procedures

The tests will be performed with the types of materials claimed to be supported by the manufacturer, but at least with the materials defined in Annex A to perform the minimum detection performance tests.

The detector or its individual components (sensor and/or analyser), when applicable, shall be connected to the nominal supply voltage and connected to the monitoring system that is appropriate to the test. It shall be allowed to stabilise for 180 s. The intrusion signal or message output shall be monitored. If multiple sensitivity modes are available, any non-compliant modes shall be identified by the manufacturer. All compliant modes shall be tested. The detector shall be mounted according to the installation instructions, any cover(s) shall be mounted properly before any test takes place.

6.3 Basic Detection Test

6.3.1 General

The purpose of the Basic Detection Test is to verify that a detector is still operational after a test or tests has/have been carried out. The Basic Detection Test verifies only the qualitative performance of the detector.

6.3.2 Basic Detection Test Method

The detector shall generate an intrusion signal or message when the detector or its individual components (sensor/s), when applicable, are mounted according to the manufacturer instructions, set to maximum sensitivity level and tests are carried out according to 6.4.2.2.

The test will be performed according to the manufacturer's instructions after the first installation, the settings and results will be noted to verify that all detectors or its individual components (sensor/s), when applicable, are installed correctly, it will be called the initial test. It will be performed again, after and/or during the environmental tests under the same conditions / settings of the initial test had been performed, to verify that the detectors will still function as claimed by the manufacturer (e.g. detection range). The result will then be compared to those of the initial test.

If the test is not compatible with the detector, use the manufacturer's information to generate the correct algorithm.

Pass / fail criteria: The detector(s) shall produce an intrusion signal or message when exposed to an alarm stimulus both before and after being subjected to any test that may adversely affect its performance.

6.4 Performance tests

6.4.1 General

The general test conditions of 6.2.2 shall apply to all tests in this series.

Detection performance shall be tested against the manufacturer's documented claims. Any variable controls shall be set to the values recommended by the manufacturer to achieve the claimed performance.

The detectors shall be assessed in the specified test environment.

6.4.2 Verification of detection performance

6.4.2.1 General

All performance tests are based on physical shock characteristics (e.g. the shock in order to penetrate the monitored area) of the size and types of material claimed to be supported by the manufacturer including the standard material types listed in Annex A.

The minimum requirement for this test shall include at least the materials and minimum distances listed in Table G.1. If the manufacturer claims to support wider ranges and/or other materials, additional tests to the ones described in this section need to be performed for each claim.

Calibrated spring-operated hammer(s) according to Annex E will be used for testing the standard maximum sensitivity level according to the minimum settings per material as test tool in Annex G.

The values defined in Annex G are the minimum performance to be achieved by all shock detectors, if further settings are allowed to achieve higher sensitivity, these should be documented by the manufacturer and duly tested, when set to the chosen sensitivity level required to pass, the immunity tests shall be carried out successfully, when the detector is set for each higher sensitivity level.

The shock detector shall be set to the sensitivity level as defined by the manufacturer and appropriate for the monitored material and area. The level needs to be adjusted when the monitored material and area is changed. Furthermore the individual settings shall be noted, as those levels will be used for the immunity tests carried out later.

For testing, calibrated spring-operated hammer(s) as defined in Annex E should be used.

For each standard test material a specimen according to Annex A shall be used and shall be fulfilled for each specimen before the tests are carried out as preconditions.

6.4.2.2 Gross attack detection performance test

This test will verify the detection performance for sensitivity and area of coverage according to the supported conditions claimed by the manufacturer for a gross attack.

The spring-operated hammer shall be adjusted to the material dependent value given in Annex G. The hammer shall be placed on the material at a distance from the centre of the sensor element of the shock detector according to Annex G on the same side as the sensor element in spring loaded mode. The spring shall be released. The output of the detector shall be monitored if an alarm signal or message had been generated.

Between each test, a minimum pause of 5 min shall apply, if not advised differently by the manufacturer, to allow the detector to go into normal mode.

This test shall be carried out ten times in different positions according to the radius given in Table G.1 for each material, at least one test should be carried out on the glass, the fixed frame and on the movable frame when the test for the framed window is performed.

If a higher distance for each material is claimed to be supported by the manufacturer, and/or other material, the same test shall be carried out for each material and distance as stated ten times.

Pass/Fail criteria: For each standard material and each minimum distance according to Annex G and each additional material or distance claimed to be supported by the manufacturer, at least nine out of ten tests for each material and/or distance shall be detected to pass this test.

6.4.2.3 Low shock integration attack detection performance test

This test will verify the detection performance for sensitivity and area of coverage according to the supported conditions claimed by the manufacturer for a low shock integration attack.

One or more spring-operated hammer(s) shall be adjusted to the material dependent value given in Annex G. The hammer shall be placed on the material at a distance from the centre of the sensor element of the shock detector according to Annex G on the same side as the sensor element in spring loaded mode. The spring shall be released. The output of the detector shall be monitored if an alarm signal or message had been generated. To reflect the low shock integration, this should be performed ten times with a frequency of 1 Hz to form one test.

Between each test, a minimum pause of 5 min shall apply, if not advised differently by the manufacturer, to allow the detector to go into normal mode.

This test shall be carried out ten times in different positions according to the radius given in Table G.1 for each material, at least one test should be carried out on the glass, the fixed frame and on the movable frame when the test for the framed window is performed.

If a higher distance for each material is claimed to be supported by the manufacturer, and/or other material, the same test shall be carried out for each material and distance as stated ten times.

Pass/Fail criteria: For each standard material and each minimum distance according to Annex G and each additional material or distance claimed to be supported by the manufacturer, at least nine out of ten tests for each material and/or distance shall be detected to pass this test.

6.5 Switch-on delay, time interval between signals and indication of detection

Switch on the shock detector power with the indicator enabled, if available, and allow 180 s for stabilisation. Carry out the basic detection test. Note the response. After the specified time interval between signals carry out the basic detection test. Note the response. Disable the intrusion indicator, if available and supported. After the specified time interval between signals carry out the basic detection test. Note the response.

Pass/Fail Criteria: The shock detector shall generate an intrusion signal or message in response to each of the three basic detection tests. For the first and second basic detection tests, the intrusion signal or message and the intrusion indicator, if available, shall both respond. For the third basic detection test there shall be no indication, if available and supported.

6.6 Self tests

Carry out the basic detection test to verify that the shock detector is operating.

Pass/Fail Criteria: The shock detector shall generate an intrusion signal or message and shall not generate tamper or fault signals or messages.

If a shock detector provides a local self test, either optional or mandatory according to Table 1, monitor the shock detector during a local self test.

Pass/Fail Criteria: The shock detector shall not generate any intrusion, tamper or fault signals or messages.

If a shock detector supports a remote self test, either optional or mandatory according to Table 1, monitor the shock detector during a local self test. Note the response.

Pass/Fail Criteria: The shock detector shall generate an intrusion signal or message and shall not generate tamper or fault signals or messages.

Short the sensor signal output to ground or carry out an equivalent action as recommended by the manufacturer.

If a shock detector supports a local self test, either optional or mandatory according to Table 1 monitor the shock detector during a local self test.

If a shock detector supports a remote self test, either optional or mandatory according to Table 1, during a remote self test.

For shock detectors with more than one sensor signal input, the test(s) shall be repeated for each output individually.

Pass/Fail Criteria: (local self test): The shock detector shall generate a fault signal or message and shall not generate intrusion or tamper signals or messages.

Pass/Fail Criteria: (remote self test): The shock detector shall generate a fault signal or message and shall not generate intrusion or tamper signals or messages.

6.7 Immunity to incorrect operation

6.7.1 General

The general test conditions of 6.2 shall apply.

The purpose of this test section is to verify that shocks which are not based on a valid impact or series of impacts on the supervised structure do not generate any type of signal or message to the CIE.

Before and after each of the following tests a basic detection test (6.3) will be performed, to verify that each detector is still in a valid working and detection condition.

The mounting positions of the detectors or sensors shall comply with the manufacturer's instructions.

Pass/Fail Criteria: There shall be no change of status of the detector(s) during each of the following tests. After each performed test a basic detection test shall generate an alarm signal or message.

6.7.2 Immunity to Small objects hitting the glass

This test will simulate hail hitting a window.

The detector shall not generate an intrusion signal or message when small objects such as hail, sand, gravel etc. hit the outside of the monitored surface, when set to the chosen sensitivity level required to pass the low shock integration attack detection performance test in 6.4.2.3 of the standard immunity window.

Whereas 6 detectors will be mounted on the frame of the opposite ('inner') side of the standard immunity window, 3 kg hail consisting out of Polyoxymethylen according the below specification will be dropped at the other ('out') side of window running through a plastic tube with a length of 1,80 m, which is mounted at a distance of 50 mm and where at the end the hail will hit the centre of the monitored standard immunity window.

Polyoxymethylen (Delrin®) ball specification:

Material	Delrin 500 or 100 (or equivalent)
Density	1 390 kgm^{-3} to 1 420 kgm^{-3} (ISO 1183)
Diameter	12 mm ± 1 mm
Quantity per kg	790 pieces to 800 pieces
Tensile strength	57 MPa to 59 MPa (ISO 527-1/-2)
Rockwell Hardness	115 to 122 HRR (ISO 2039/2)

The test set up shall be according to the schematic drawing in Annex H.

The general Pass/Fail Criteria in 6.7 shall apply.

6.7.3 Immunity to Hard objects hitting a framed window

This test will simulate hard objects hitting the centre of a supervised window (e.g. handlebars of a bicycle).

The detector shall not generate an intrusion signal or message when hard objects hit the outside of the monitored surface, when set to the sensitivity level which had been chosen for the successfully passed gross attack detection performance test in 6.4.2.2 of the standard immunity window.

Whereas 6 detectors will be mounted on the frame of the opposite ('inner') side of the standard immunity window, a pendulum test with a steel ball with the following characteristics will be performed:

Pendulum object (A)	Hardened steel ball
Diameter	40 mm ± 3 mm
Weight	0,26 kg ± 0,03 kg
Angle α	27° ± 1°
Number of tests	5
Minimum Pause between each test	5 s

Each test will consist of one hit, without repeated bouncing.

The test set up shall be according to the drawing in Annex I.

The general Pass/Fail Criteria in 6.7 shall apply.

6.7.4 Immunity to Static pressure

This test will simulate a permanent pressure against the centre of a supervised window (e.g. change of the power of installation of the glass over time / tense glass over time, objects which are leaned against the glass, etc.).

The detector shall not generate an intrusion signal or message if a permanent pressure against the monitored surface is issued, when set to the sensitivity level which had been chosen for the successfully passed gross attack detection performance test in 6.4.2.2 of the standard immunity window.

Whereas 6 detectors will be mounted on the frame of the opposite ("inner") side of the standard immunity window, a static pressure test with a pneumatic cylinder with the following characteristics will be performed:

Power with pressure object (F):	100 N ± 5 N tolerance
Exposure time:	5 s – 6 s
Number of tests:	5
Minimum Pause between each test:	5 s

Description of pneumatic cylinder:

Type:	Pneumatic cylinder
Diameter of the touching surface element:	5 cm ± 0,2 cm
Type of surface of the touching surface element:	Plain, PTFE

The test set up shall be according to the drawing in Annex J.

The general pass/fail criteria for 6.7 shall apply.

6.7.5 Immunity to Dynamic pressure

This test will simulate dynamic changing pressures against the centre of a supervised window (e.g. change of air pressure, wind etc.).

The detector shall not generate an intrusion signal or message if a dynamic changing pressure against the monitored surface is issued, when set to the sensitivity level which had been chosen for the successfully passed low shock integration attack detection performance test in 6.4.2.2 of the standard immunity window.

Whereas 6 detectors will be mounted on frame of the opposite ("inner") side of the standard immunity window, a dynamic pressure test with a pneumatic cylinder with the following characteristics will be performed:

Power with pressure object (F):	50 N ± 2.5 N tolerance
Exposure time:	1 s – 2 s
Number of tests:	5
Minimum Pause between each test:	1 s

Description of pneumatic cylinder:

Type:	Pneumatic cylinder
Diameter of the touching surface element:	5 cm ± 0,2 cm
Type of surface of the touching surface element:	plain, PTFE

The test set up shall be according to the drawing in Annex K.

The general pass/fail criteria for 6.7 shall apply.

6.7.6 Standard Immunity Test

This test will verify that a detector at the same sensitivity level that it passed the gross attack performance test at, will allow a defined level of immunity at a lower force.

The spring-operated hammer shall be adjusted to the material dependent value given in Annex G. The hammer shall be placed on the material at a distance from the centre of the sensor element of the shock detector according to Annex G on the same side as the sensor element in spring loaded mode. The spring shall be released. The output of the detector shall be monitored if an alarm signal or message had been generated.

Between each test, a minimum pause of 5 min shall apply, if not advised differently by the manufacturer, to allow the detector to go into normal mode.

This test shall be carried out ten times in different positions according to the radius given in Table G.1 for each material, at least one test should be carried out on the glass, the fixed frame and on the movable frame when the test for the framed window is performed.

Pass/Fail criteria : For each standard material and each minimum distance according Annex G, at least nine out of ten tests for each material and/or distance shall not be detected to pass this test.

6.8 Tamper security

6.8.1 General

The general test conditions of 6.2.1 shall apply.

6.8.2 Resistance to and detection of unauthorised access to the inside of the shock detector through covers and existing holes

Mount the shock detector or its relevant components (sensors, etc.) according to the manufacturer's recommendations. Using commonly available small tools such as those specified in Annex F and by attempting to distort the housing, attempt to gain access to any components, such as any means of adjustment and mounting screws, which, when interfered with, could adversely affect the operation of the shock detector or its relevant components (sensors, etc.).

Pass/Fail Criteria: Normal access shall require the use of an appropriate tool. For the grades specified in Table 3, it shall not be possible to gain access to any components, means of adjustment and mounting screws, which, when interfered with, could adversely affect the operation of the shock detector, without generating a tamper signal or message or causing visible damage.

6.8.3 Detection of removal from the mounting surface

Confirm the operation of the tamper detection element by removing the shock detector or its relevant components (sensors, etc.) from the mounting surface. Replace the unit on the mounting surface without the fixing screws, unless they form a part of the tamper detection element. Slowly prise the shock detector away from the mounting surface and attempt to prevent the tamper detection element from operating by inserting a strip of steel between 100 mm and 200 mm long by 10 mm to 20 mm wide, and 1 mm thick, between the rear of the shock detector and its mounting surface.

Pass/Fail Criteria: A tamper signal or message shall be generated before the tamper detection element can be inhibited.

6.8.4 Resistance to magnetic field interference

Connect power to the shock detector and wait 180 s. Attempt to prevent intrusion, tamper and fault signals or messages by placing a single pole of a magnet grade dependent according to Table 3 on each surface of the housing where the analyser resides of the shock detector in sequence. For each placement carry out the basic detection test and verify correct generation of intrusion, tamper and fault signals or messages. Repeat the test with the other pole.

Pass/Fail Criteria: The presence of the magnet shall not prevent correct generation of any signal or message.

6.8.5 Detection of shock detector masking

For each test, the shock detector shall be powered, each test needs to be performed and its signals or messages monitored for changes of status.

Carry out the following, grade dependent, masking tests:

a) Magnetic Masking

Shock detectors tested for compliance with grade 3 and 4, will be mounted according to the manufacturers instruction manual, wait 180 s for the system to stabilise and carry out a basic detection test. By placing a single pole of a magnet type grade depended according to Table 3 on each surface of the sensor housing of the shock detector in sequence. For each placement carry out the basic detection test and verify correct generation of intrusion, tamper and fault signals or messages. Repeat the test with the other pole.

After each individual masking application, wait 180 s for the system to stabilise and carry out a basic detection test.

Pass/Fail Criteria: A masking signal or message as described in Table 2 shall be generated within 180 s of the masking condition being applied, and shall continue to be generated for at least as long as the magnet is in place. Alternatively for grade 3, the shock detector shall continue to operate normally.

If an individual test is failed, it shall be repeated twice more. Two passes out of the three tests shall constitute a passed test.

b) Detection of penetration of sensor housing

This test will verify the ability of the shock sensor housing to detect the unauthorised access for preventing the fixing of the active sensor component e.g. via a screw or superglue.

Shock detectors tested for compliance with grade 4, will be mounted according to the manufacturers instruction manual, wait 180 s for the system to stabilise and carry out a basic detection test.

Drill a 1 mm hole using a metal drill on a randomly chosen position on each accessible surface, but at least a minimum of five holes, on randomly chosen positions on one shock detector or on a corresponding number of shock detectors or covers.

Pass/Fail Criteria: A masking signal or message as described in Table 2 shall be generated when a hole is drilled.

6.9 Electrical tests

6.9.1 General

Ensure that the shock detector is installed according to the manufacturers installation instructions and the Basic detection test had been performed successfully.

Connect the detector to a variable, stabilised power supply and allow it to stabilise for at least 180 s.

Table 4 specifies Grade dependency.

6.9.2 Shock detector current consumption

This test is not applicable to shock detectors with Type C power supplies.

If the analyser is integrated in the CIE, these test shall be performed on the individual sensor components, if applicable.

Connect the shock detector to a suitable variable, stabilised power supply with a current measuring meter in series. Connect a voltmeter across the power input terminals of the shock detector. Set the voltage to the nominal supply voltage and allow the shock detector to stabilise for at least 180 s.

Place the shock detector in the mode which draws the maximum current as described by the manufacturer and measure the current drawn.

Place the shock detector in the mode which draws quiescent current as described by the manufacturer and measure the current drawn.

Pass/Fail Criteria: The current shall not exceed the manufacturer's stated values by more than 20 % in either mode.

6.9.3 Slow input voltage change and input voltage range limits

If the analyser is integrated in the CIE, these test shall be performed on the individual sensor components, if applicable.

Connect the shock detector to a suitable variable, stabilised power supply.

Raise the supply voltage from zero at a rate of 0,1 Vs^{-1} in steps not greater than 10 mV until the nominal supply voltage V –25 % is reached, or the minimum supply voltage specified by the manufacturer, whichever is lower. Allow the shock detector to stabilise for 180 s.

Monitor the intrusion and fault signals or messages and carry out the basic detection test. This test is not applicable to shock detector with Type C power supplies.

Pass/Fail Criteria: The basic detection test shall cause an intrusion signal or message and shall not cause a fault signal or message.

Reset the input voltage to the nominal V +25 % or the maximum level specified by the manufacturer, whichever is greater. Allow the shock detector to stabilise for 180 s. Monitor the intrusion and fault signals or messages and carry out the basic detection test. This test is not applicable to shock detector with type C power supplies.

Pass/Fail Criteria: The basic detection test shall cause an intrusion signal or message and shall not cause a fault signal or message.

According to the grade dependence as defined in Table 1 for wired and wire-free shock detectors, lower the supply voltage at a rate of 0,1 Vs^{-1} in steps of not more than 10 mV until a fault signal or message is generated. Carry out the basic detection test.

Pass/Fail Criteria: The shock detector shall generate a fault signal or message prior to the situation where no intrusion signal or message is generated when the basic detection test is carried out.

6.9.4 Input voltage ripple

This test is not applicable to shock detectors with Type C power supplies.

If the analyser is integrated in the CIE, these test shall be performed on the individual sensor components, if applicable.

Set a signal generator to the nominal voltage V. Allow 180 s for the shock detector to stabilise. Modulate the shock detector supply voltage V by ± 10 % at a frequency of 100 Hz for a further 180 s.

During the application of the ripple carry out a basic detection test. Observe whether any intrusion or fault signals or messages are generated.

Pass/Fail Criteria: There shall be no unintentional signals or messages generated by the shock detector during the voltage ripple test. There shall be an intrusion signal or message generated by the basic detection test.

6.9.5 Input voltage step change

This test is not applicable to shock detectors with Type C power supplies.

If the analyser is integrated in the CIE, these test shall be performed on the individual sensor components, if applicable.

Connect the shock detector to a square wave generator limited to a maximum current of 1 A, capable of switching from the nominal supply voltage V to the nominal voltage V ± 25 % in 1 ms.

Set the input voltage to the nominal supply voltage V and allow at least 180 s for the shock detector to stabilise. Monitor intrusion and fault signals or messages. Apply ten successive square wave pulses from nominal supply voltage V to V + 25 %, of duration 5 s at intervals of 10 s. Repeat the step change test for the voltage range V to V – 25 %.

Pass/Fail Criteria: There shall be no unintentional signals or messages generated by the shock detector during the test.

6.9.6 Total loss of power supply

This test is not applicable to shock detectors with Type C power supplies.

If the analyser is integrated in the CIE, these test shall be performed on the individual sensor components, if applicable.

Connect the shock detector to a suitable variable, stabilised power supply. Set the voltage to the nominal supply voltage and allow the shock detector to stabilise for at least 180 s.

Monitor the intrusion and fault signals or messages and disconnect the shock detector from the power supply.

Pass/Fail Criteria: The shock detector shall either generate signals or messages according to the requirements of Table 2. Alternatively for bus based system total loss of power supply may be determined by loss of communication with the shock detector.

6.10 Environmental classification and conditions

Unless stated otherwise the general test conditions of 6.2.1 shall apply.

Shock detectors or its individual components (sensor and/or analyser), when applicable shall be subjected to the environmental conditioning described in EN 50130-5 according to the requirements of Tables 5 and 6, and the tests of the EMC product family standard EN 50130-4.

Shock detectors or its individual components (sensor and/or analyser), when applicable subjected to the operational tests are always powered. Shock detectors or its individual components (sensor and/or analyser), when applicable subjected to the endurance tests are always un-powered.

Monitor the detector for unintentional intrusion and (where applicable) tamper signals or messages. No functional test is required during the tests.

After the tests and any recovery period prescribed by the environmental test standard carry out the Basic Detection Test, and visually inspect the detector both internally and externally for signs of mechanical damage.

After the water ingress test, wipe any water droplets from the exterior of the enclosure, dry the detector, and carry out the Basic Detection Test. Warm air shall not be used for drying.

After the SO_2 test, detectors shall be washed and dried in accordance with the procedure prescribed in IEC 68-2-52:1984. The Basic Detection Test shall be performed immediately after drying.

Table 5 – Operational tests

Test	Environmental classification			
	Class I	Class II	Class III	Class IV
Dry heat	Required	Required	Required	Required
Cold	Required	Required	Required	Required
Damp heat (steady state)	Required	Not required	Not required	Not required
Damp heat (cyclic)	Not required	Required	Required	Required
Water ingress	Not required	Not required	Required	Required
Mechanical shock	Required	Required	Required	Required
Vibration	Required	Required	Required	Required
Impact	Required	Required	Required	Required
EMC	Required	Required	Required	Required

Pass/ fail criteria: No unintentional signals or messages shall occur during the tests. There shall be no signs of mechanical damage after the tests and the shock detector shall continue to meet the requirements of the basic detection test. It is permissible for the shock detector to generate an intrusion signal during the mechanical shock, vibration and the impact test.

Table 6 – Endurance tests

Test	Environmental classification			
	Class I	Class II	Class III	Class IV
Damp heat (steady state)	Required	Required	Required	Required
Damp heat (cyclic)	Not required	Not required	Required	Required
SO2 corrosion	Not required	Required	Required	Required
Vibration (sinusoidal)	Required	Required	Required	Required

Pass/ fail criteria: There shall be no signs of mechanical damage after the tests and the shock detector shall continue to meet the requirements of the basic detection test. It is permissible for the shock detector to generate an intrusion signal during the vibration test.

6.11 Marking, identification and documentation

6.11.1 Marking and/or identification

Examine the shock detector or its individual components (sensor and/or analyser), when applicable visually to confirm that it is marked either internally or externally with the required marking and/or Identification (given in EN 50131-1).

Pass/ fail criteria: All specified markings shall be present.

6.11.2 Documentation

By visual inspection ensure the shock detector or its individual components (sensor and/or analyser), when applicable has been supplied with clear and concise installation instructions and maintenance functions, all information specified in this specification and in EN 50131-1, and the manufacturer's claimed performance data.

Pass/ fail criteria: All information specified shall be present.

Annex A
(normative)

Standard test material

A.1 Framed glass window

A framed glass window at a size of 1,2 m by 1,2 m shall be fixed according to the following description :

Complete glazed UVPC framed window with an inner framed aluminium core and all fittings required to be fully functional (opening and closing).

Glass Size	Glass dimensions which allow glass to be fitted into the 1200 mm by 1200 mm UVPC frame
Glass Thickness	6 mm ± 1 mm
Glass Type	Single pane float glass

The framed window needs to be mounted rigid e.g. in a fixed frame, to allow the shock wave to propagate with a minimum absorption level due to the installation of the framed window.

A.2 Wooden plate

A wooden plate (plywood versions are allowed) at a size of 2 m by 2 m fulfilling the following requirements at a temperature level of 15 °C – 30 °C :

Moisture content between 5 % and 18 %

Thickness of 26 mm

Density at a po - level between 500 kg / m^3 - 800 kg / m^3

The wooden plate needs to be mounted rigid e.g. in a fixed frame, to allow the shock wave to propagate with a minimum absorption level due to the installation of the wooden plate.

A.3 Concrete plate

A concrete plate at a size of 1,20 m by 1,20 m fulfilling the following requirement :

Density at a po - level between 2200 kg / m^3 - 2500 kg / m^3

Resistance to pressure level between 120 MPa – 140 MPa

Thickness of 40 mm

Steel reinforced concrete

The concrete plate needs to be mounted rigid e.g. in a fixed frame, to allow the shock wave to propagate with a minimum absorption level due to the installation of the concrete plate.

Annex B
(normative)

Dimensions and requirements of the standardised Test Magnets

Requirements and normative references

The following standards will form the base for the selection of the test magnets:

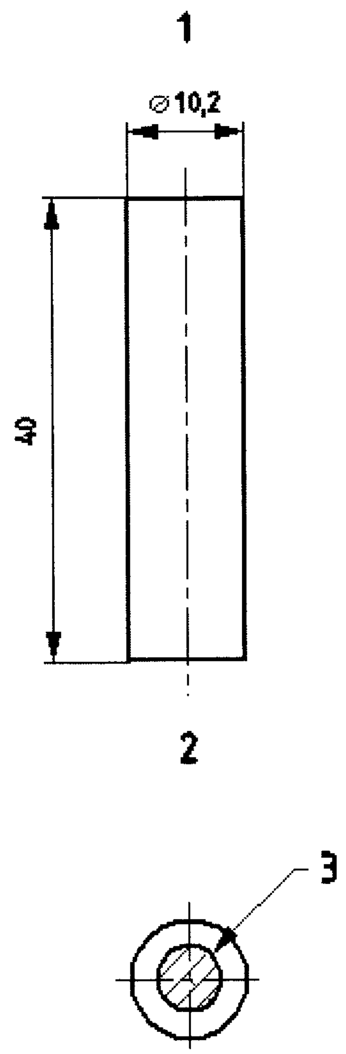
IEC 60404-8-1, *Magnetic materials — Part 8-1: Specifications for individual materials — Magnetically hard materials*

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

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*

The field strength of the magnet determined by the magnetic material, by remanence (B_r) in mT, the product of energy (BH)max in kJm^{-3} and the polarisation of the working point in mT.

The relevant values, dimensions and measurement points for the test magnets can be found in the following drawings and tables. For calculations, measurements and calibrating the test magnets refer to the above standards.

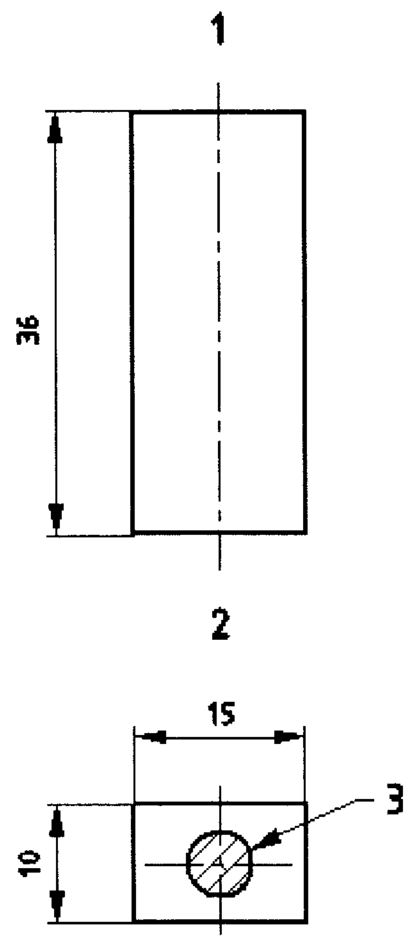


Key

1 north pole
2 south pole
3 north pole (shaded)

Material	ALNiCo 34/5 (Code number R1-1-10)
Remanence B_r min.	1 120 mT
Product of energy $(BH)_{max.}$	34 kJ/m^3
Polarisation of working point	0,835 T +/-2 %

Figure B.1 – Magnet Type 1



Key
1 north pole
2 south pole
3 north pole (shaded)

Material	NdFeB N38 (REFeB 280/120 - Code number R5-1-7) nickeled
Remanence B_r min.	1 240 mT
Product of energy (BH) $_{max.}$	280 kJ/m^3
Polarisation of working point	Remanence B_r - 5 %

Figure B.2 – Magnet Type 2

Annex C
(normative)

General Testing Matrix

Table C.1 – General testing matrix (1 of 2)

Main test title	**Task to be performed in conjunction with main test**			**Sample no.**
	Before main test	**During main test**	**After main test**	
Gross attack detection performance test	None	6.4.2.2	None	1
Low shock integration attack detection performance test	None	6.4.2.3	None	1
Switch-on delay, time interval between signals and indication of detection	None	6.5	None	1
Self tests	6.8.5 a)	6.6	None	2
Immunity to Small objects hitting the glass	None	6.7.2	None	1, 11 - 15
Immunity to Hard objects hitting a framed window	None	6.7.3	None	1, 11 - 15
Immunity to Static pressure	None	6.7.4	None	1, 11 - 15
Immunity to Dynamic pressure	None	6.7.5	None	1, 11 - 15
Standard immunity Test	None	6.7.6	None	1, 11 - 15
Resistance to and detection of unauthorised access to the inside of the shock detector through covers and existing holes	None	6.8.2	None	10
Detection of removal from the mounting surface	None	6.8.3	None	10
Resistance to magnetic field interference	None	6.8.4	None	10
Detection of shock detector masking / Magnetic Masking	6.8.5 b)	6.8.5 a)	6.6	2
Detection of shock detector masking / Detection of penetration of sensor housing	None	6.8.5 b)	6.8.5 a)	2
Shock detector current consumption	None	6.9.2	None	1
Slow input voltage change and input voltage range limits	None	6.9.3	None	1
Input voltage ripple	None	6.9.4	None	1

Table C.1 (2 of 2)

Main test title	**Task to be performed in conjunction with main test**			**Sample no.**
	Before main test	**During main test**	**After main test**	
Input voltage step change	None	6.9.5	None	1
Total loss of power supply	None	6.9.6	None	1
Dry heat	6.3.2	6.10	6.3.2	3
Cold	6.3.2	6.10	6.3.2	3
Damp heat (steady state)	6.3.2	6.10	6.3.2	4
Damp heat (cyclic)	6.3.2	6.10	6.3.2	4
Water ingress	6.3.2	6.10	6.3.2	5
Mechanical shock	6.3.2	6.10	6.3.2	6
Vibration	6.3.2	6.10	6.3.2	7
Impact	6.3.2	6.10	6.3.2	6
EMC	6.3.2	6.10	6.3.2	8
Damp heat (steady state)	6.3.2	6.10	6.3.2	4
Damp heat (cyclic)	6.3.2	6.10	6.3.2	4
SO_2 corrosion	6.3.2	6.10	6.3.2	9
Vibration (sinusoidal)	6.3.2	6.10	6.3.2	7
Marking and/or identification	None	6.11.1	None	1
Documentation	None	6.11.2	None	1

Annex D
(normative)

Standard immunity glass pane

The standard glass pane as defined in A.1 will be used for all tests where a standard immunity glass pane is required.

Annex E
(normative)

Spring operated Hammer

For the impact tests described in this standard a calibrated spring-operated hammer shall be used in accordance with:

EN 60068-2-75:1997, Clause 5 and Annex E

The hammer head shall be constructed out of polyamide with a spherical segment shape with a radius of 10 mm.

The tolerances of EN 60068-2-75 for the emitted force shall apply.

NOTE Spring-operated Impact-Test Apparatus in different versions can be found

PTL Dr. Grabenhorst GmbH
D - 95343 Stadtsteinach / Germany
P.O. Box 1253
http://www.ptl-test.de/

Typical springhammer types from this company available are:

F 22.10	Fixed force at 0,14 J
F 22.50	Adjustable force at the levels 0,20 J, 0,35 J, 0,50 J, 0,70 J and 1,00 J

Annex F
(informative)

Example list of small tools

Penknife	Magnets
Steel ruler	Paper
Wire	Pliers
Matches	Small screwdriver set
Paper clip	Stiff wire (1 mm ± 0,05 mm as EN 60529:1991, IP4X)
Pen	

Annex G
(normative)

Minimum performance requirements gross and shock integration attack tests

Table G.1 – Minimum Requirements for shock levels

Type of material	Minimum distance from sensor / radius	Adjusted setting of spring hammer		
		Gross attack test	Low Integration attack test	Standard Immunity test
framed glass window according to A.1	1 m	0,5 J	0,20 J	0,14 J
wooden plate according to A.2	1 m	0,5 J	0,20 J	0,14 J
concrete plate according to A.3	0,5 m	0,5 J	0,20 J	0,14 J

Annex H
(normative)

Immunity test: Small objects hit sensitivity

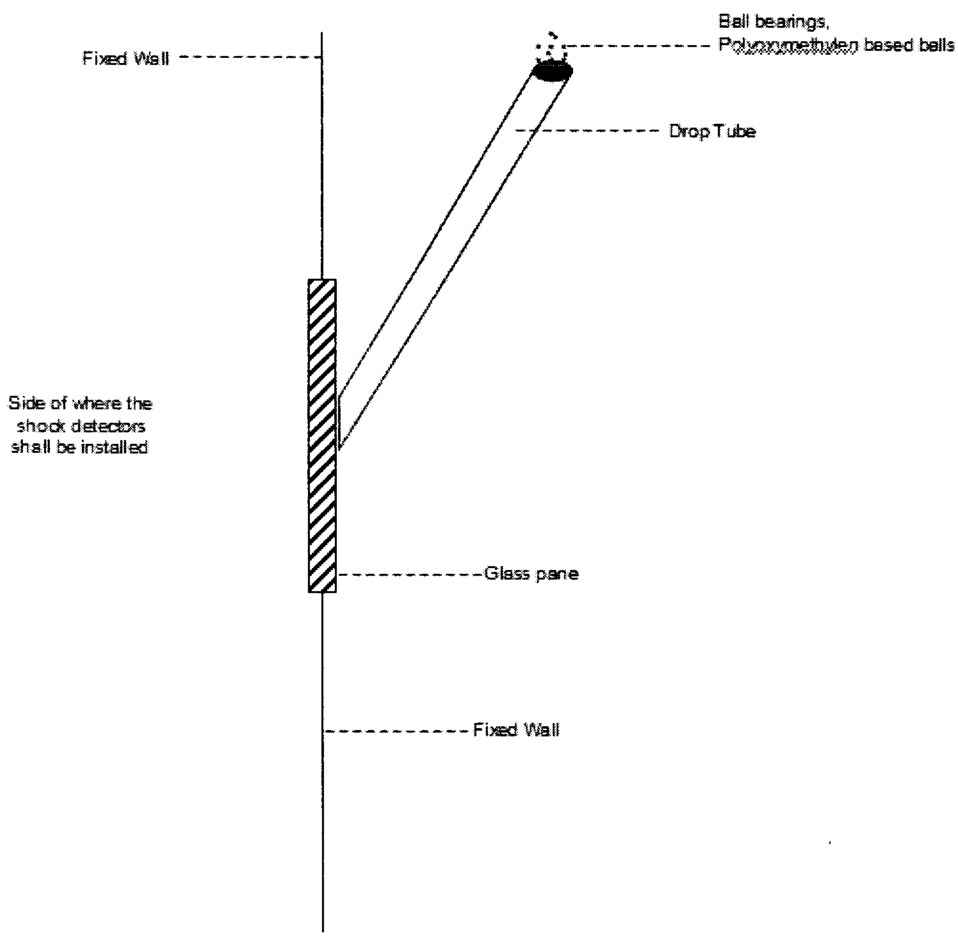


Figure H.1 – Immunity test: small objects hit sensitivity

Annex I
(normative)

Immunity test: Hard objects hit sensitivity

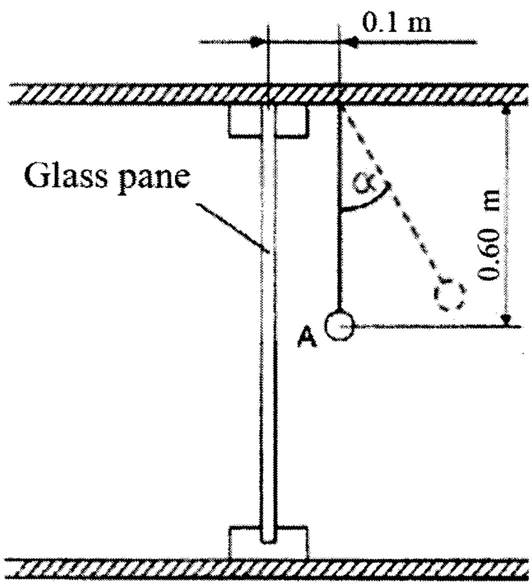


Figure I.1 – Immunity test: hard objects hit sensitivity

Annex J
(normative)

Immunity test: Static pressure sensitivity

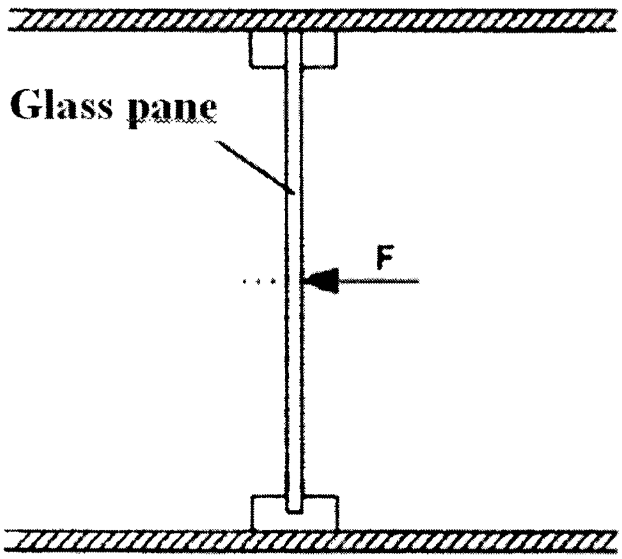


Figure J.1 – Immunity test: static pressure sensitivity

Annex K
(normative)

Immunity test: Dynamic pressure sensitivity

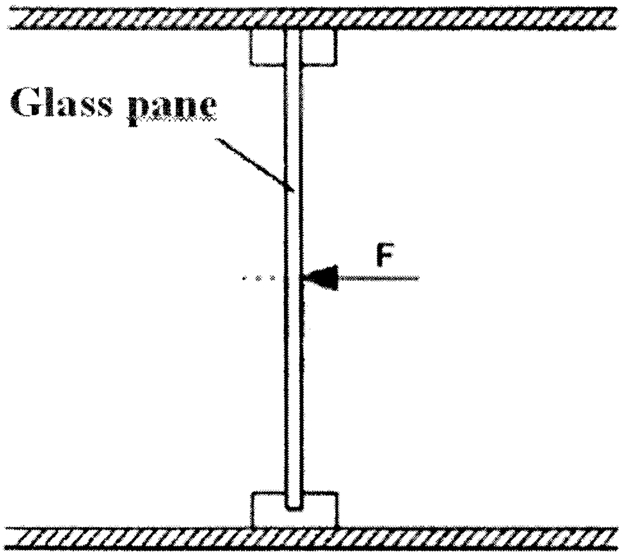


Figure K.1 – Immunity test: dynamic pressure sensitivity

Bibliography

EN 60529:1991, *Degree of protection provided by enclosures (IP code) (IEC 60529:1989)*

INTERPRETATION SHEET
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Alarm systems - Intrusion and hold-up systems - Part 2-8: Intrusion detectors - Shock detectors

Systèmes d'alarme -
Systèmes d'alarme contre l'intrusion et les hold-up -
Partie 2-8: Détecteurs d'intrusion -
Détecteurs de chocs

Alarmanlagen -
Einbruchmeldeanlagen -
Teil 2-8: Anforderungen an
Erschütterungsmelder

This Technical Specification was approved by CENELEC on 2013-12-23.

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CENELEC

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

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Foreword

This Interpretation Sheet to the European Standard CLC/TS 50131-2-8:2012 was prepared by CLC/TC 79 "Alarm systems".

Text of IS1 to EN 50131-2-8:2012

Clause:

Annex B and Figure B.1

Question:

Would it be allowed for test purposes (for test houses and manufacturers) to use the NeoDym magnet listed below instead of the AlNiCo version described in Annex B and Figure B.1 for reproducible tests ?

Interpretation:

Yes, because this will allow stable and reproducible test results, which is not guaranteed while using the AlNiCo magnet due to the nature of the magnet material. Furthermore, the test magnet described below allows a high-level degree of backward compatibility for already tested products, while it gives the stability required.

Therefore, when the NeoDym magnet is used for test purposes (for test houses and manufacturers), the text below may be used in place of Annex B.

Validity:

This interpretation remains valid until an amendment or updated standard dealing with this issue is published by CENELEC.

Annex B
(normative)

Dimensions and requirements of the standardised test magnets

B.1 Normative references

The interference test magnets shall comprise a magnet identical to the corresponding magnet supplied with the detector and one of the following specified independent test magnets according to whether the detector is surface or flush mounted.

The following standards will form the base for the selection of the independent test magnet:

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

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)*

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

B.2 Requirements

The field strength of the magnet determined by the magnetic material, by remanence (B_r) in mT and the product of energy $(BH)_{max}$ in kJ/m³, which are material dependent as the values describe the full saturation of that material should be measured before any calibration took place.

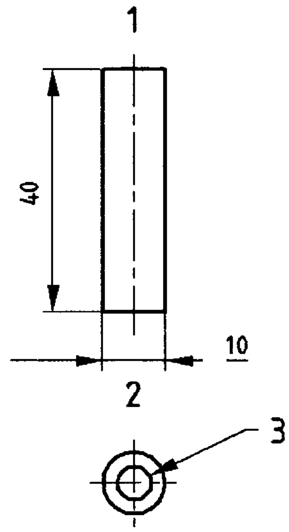
The field strength of the test magnet needs to be adjusted at the polarization of the working point in mT as defined.

The relevant value, dimensions and measurement point for the test magnet can be found in the following drawings and tables. For calculations, measurements and calibration of the test magnets, the norms cited above shall be used.

The independent test magnet for Test Magnet Type 1 is described in Figure B.1.

To get the magnets in question adjusted to the proper values and calibrated (e.g. polarization in working point), it is strongly suggested to perform adjustments of the magnetic values for ordered magnets performed by an accredited test house for magnetic fields. One potential source could be the following:

MAGNET-PHYSIK
Dr. Steingroever GmbH
Emil-Hoffmann-Strasse 3
50966 Cologne, Germany
www.magnet-physik.de



Key

1 North pole
2 South pole
3 North pole

Material	NdFeB N40 (REFeB 310/130 - Code number R5-1-11)
Remanence B_r min	1 275 mT ± 2 %
Product of energy $(BH)_{max}$	310 kJ/m^3 ± 3 %
Polarization of working point	0,835 T ± 2 %

Figure B.1 – Magnet Type 1