



SLOVENSKI STANDARD

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Alarm systems - Part 2: Requirements for intruder alarm systems - Section 7: Passive glass break detectors for use in buildings

Alarm systems - Part 2: Requirements for intruder alarm systems - Section 7: Passive
glass-break detectors for use in buildings

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Systemes d'alarme - Partie 2: Prescriptions pour les systemes d'alarme anti-intrusion -
Section 7: Detecteurs passifs de bris de glace dans les batiments

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anti-intrusion**

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Alarm systems

**Part 2:
Requirements for intruder alarm systems
Section 7 – Passive glass-break detectors
for use in buildings**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ALARM SYSTEMS –

**Part 2: Requirements for intruder alarm systems –
Section 7: Passive glass-break detectors for use in buildings**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international cooperation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters, prepared by technical committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 3) They have the form of recommendations for international use published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.

International Standard IEC 839-2-7 has been prepared by IEC technical committee 79: Alarm systems.

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

DIS	Report on voting
79(CO)52	79/136/RVD

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

ALARM SYSTEMS –

Part 2: Requirements for intruder alarm systems – Section 7: Passive glass-break detectors for use in buildings

1 Scope

This section of IEC 839-2 gives the specific requirements and test methods for passive glass-break detectors using piezoelectric sensors for use in intruder alarm systems installed in buildings.

This standard is an addition to the general requirements for detectors for use in intruder alarm systems as specified in IEC 839-2-2, and should also be used in conjunction with the standard for general requirements for alarm systems, IEC 839-1-1.

This standard applies to detectors designed to detect the breaking of glazed areas of standard glass or plate glass on which the sensor is mounted.

NOTES

- 1 The detectors may not be suitable for use on toughened glass, laminated glass, plastic-coated glass or wired glass.
- 2 Other glass-break detectors will be covered in other standards.

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2 Normative references

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The following normative documents contain provisions which, through reference in this text, constitute provisions of this section of IEC 839-2. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this section of IEC 839-2 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 68-1: 1988, *Environmental testing – Part 1: General and guidance*

IEC 68-2-62: 1991, *Environmental testing – Part 2: Tests – Test Ef: Impact, pendulum hammer*

IEC 801-3: 1984, *Electromagnetic compatibility for industrial-process measurement and control equipment – Part 3: Radiated electromagnetic field requirements*

IEC 839-1-1: 1988, *Alarm systems – Part 1: General requirements – Section One: General*

IEC 839-1-3: 1988, *Alarm systems – Part 1: General requirements – Section Three: Environmental testing for alarm systems*

IEC 839-2-2: 1987, *Alarm systems – Part 2: Requirements for intruder alarm systems – Section Two: Requirements for detectors – General*

3 Definitions

For the purpose of this section of IEC 839-2 the following definitions apply in addition to those given in IEC 839-1-1 and IEC 839-2-2.

3.1 break: The result of an impact on a sheet of glass which causes fragmentation of the glass and which leaves an aperture in the glass.

3.2 passive glass-break detector: A detector whose sensor is mounted on the surface of a sheet of glass and which responds to the shock waves transmitted through the glass when it is broken.

NOTE - For a passive glass-break detector using a piezoelectric sensor, the sensor is bonded to the surface of the glass by means of an adhesive.

3.3 detection coverage: The area of a sheet of glass within which a break will be reliably detected.

3.4 detection range: The distance in a given direction from the sensor to the boundary of the detection coverage.

4 General considerations

The detector shall consist of one or more sensors and a processor. Where the processor is contained in the same housing as the sensor, for the purposes of this standard the detector will be referred to as a sensor. Where the processor is separated from the sensor it shall meet the requirements of IEC 839-2-2.

The sensitivity of the detector is limited in order to avoid false alarms from normal impacts, but the detector may still be susceptible to deliberate attempts to cause false operation. The limitation of sensitivity means that this type of detector is unsuitable for the detection of forms of attacks on the glass other than by breaking, such as by the use of a glass cutter.

Because of the uncertain and variable nature of the breaking of glass, it is not possible to specify precise limits for the performance of passive glass-break detectors and therefore a statistical test method has been specified for the verification of the detection range.

The variable nature of the signals from breaking glass is such that this test should only be considered to be a gross test of performance.

5 Requirements

5.1 *Functional*

5.1.1 *Signal processing*

The detector shall generate an alarm condition as a result of a break in the glass within the area of detection coverage when assessed in accordance with the test methods as given in 6.3.1 and 6.3.2.

The reproducibility of detectors shall be such that the range of sensitivity does not exceed 2:1.

The detector shall not generate an alarm condition when subjected to the following influences without the glass being broken:

- impact on the detector;
- soft impact against the glass;
- hard impact against the glass;
- throwing of gravel against the glass.

5.1.2 *Sensitivity adjustment*

No additional requirements.

5.1.3 *Supply voltage*

The detector shall meet the requirements of this standard within a supply voltage range of $\pm 25\%$.

5.1.4 *Tamper detection*

Tamper detection shall be fitted to any housing which is designed to be opened.

5.1.5 *Protection against tamper*

The application of magnetic fields to the outside of the glass shall not generate an alarm condition other than a tamper alarm and shall not prevent the detector from operating within specification.

5.1.6 *Cable protection*

Where a sensor is in a separate housing from its processor the connecting cable between the sensor and the processor shall be considered to be part of the detector. It shall be electrically monitored in such a way that if the disconnection of any conductor or short circuit of all conductors prevents alarm information or a tamper alarm being received by the processor, the processor itself shall generate an alarm condition within 10 s.

5.2 *Environmental*

The sensor shall meet its operational requirements after being subjected to the environmental tests specified in 7.2 of IEC 839-2-2 with the following modifications:

- dry heat: temperature of 70 °C for 16 h;
- cold: temperature of -10 °C for 16 h.

The sensor shall not generate a false alarm when it is subjected to temperatures between -10 °C and -25 °C.

NOTE - It is not required that the detector meets its specified performance within this temperature range.

The sensor, mounted on glass in accordance with the manufacturer's instructions, shall meet its operational requirements after being subjected to temperature cycling between -10 °C and +40 °C in high humidity.

5.3 *Safety*

No additional requirements.

5.4 *Reliability*

No additional requirements.

5.5 *Interface*

No additional requirements.

5.6 *Construction*

The sensor construction shall be of rugged design such that the sensor will survive a free fall from a height of 2 000 mm on to a concrete floor.

An adhesive shall be specified by the manufacturer which is suitable for bonding the sensor to the glass with sufficient strength to maintain the bond when the sensor is subjected to impacts, thermal stress, window-cleaning solvents, salt water and UV-radiation.

The manufacturer shall supply evidence that both the adhesive and the material of the sensor housing are suitable for an operational lifetime in excess of 60 000 h.

If the adhesive requires a UV shield on the outside of the glass, this shield shall be used during the tests and shall be applied according to the manufacturer's instructions.

The design of the sensor housing shall be such that no moisture traps shall exist between the sensor housing and the glass surface when the sensor is bonded to the glass in accordance with the manufacturer's instructions.

5.7 *Marking*

No additional requirements.

5.8 *Manufacturer's specifications*

In addition to the information required in 6.8 of IEC 839-2-2, the manufacturer shall provide the following information:

- a list of those types of glass for which the detector is suitable;
- the detection coverage for each type of glass listed.

5.9 *Enhancements*

The detector shall provide a latched indication of an alarm condition for each sensor.

When the indication is given at the sensor, it shall not be visible from the opposite side of the glass to that on which the sensor is bonded.

5.10 *Installation test equipment*

Equipment shall be provided which will permit a test of an installed detector by applying a stimulus to the surface of the glass at a specified range from the sensor. When the test is carried out in accordance with the manufacturer's instructions it shall generate an alarm condition.

6 Test methods

A minimum of 10 detectors or 10 sensors with the appropriate number of processors shall be submitted for the tests.

6.1 *Sensitivity, reproducibility and sorting*

Ten samples shall be tested using the arrangement shown in figure 1.

The sensor shall be sonically coupled to the glass surface using a suitable coupling liquid, such as a 35 % solution of monoethylene glycol in water, which shall remain consistent throughout the period of the tests.

Each sensor shall be connected to a processor and the detector shall be in the operating condition during the tests.

Where the processor includes a sensitivity adjustment, this shall be set for maximum sensitivity.

The sensor under test shall be moved slowly across the surface of the glass while the signal amplitude and the sweep rate applied to the test probe are varied, in order to determine the minimum signal amplitude at which reliable detection takes place. This value shall be recorded.

NOTES

- 1 Where the signal processing used in the detector is not compatible with the above test, the manufacturer may propose an alternative but equivalent test.
- 2 This test is designed to provide a relative measurement of sensitivity between a number of sensors or detectors or a relative measurement of sensitivity of a single sensor or detector before and after environmental conditioning. It is not designed to demonstrate that a detector has a specific sensitivity related to the detection range stated by the manufacturer for which reference should be made to 6.3.2.

The recorded values of the signal amplitude for the 10 detectors shall not vary by more than a factor of 2:1.

The sensors shall be sorted in ascending order of sensitivity and shall be allocated a number, starting with number 1 for the lowest sensitivity.

6.2 *Test matrix*

The numbered sensors shall be subjected to the tests given in table 1. Where a sensor is subject to more than one test, the test shall be carried out in the sequence shown.

Table 1 – Test matrix

Test	Subclause	Sample										Group
Reproducibility	6.1	X	X	X	X	X	X	X	X	X	X	
Sensor sensitivity		low					high					
Sensor number		1	2	3	4	5	6	7	8	9	10	
Detection range	6.3.2	X									X	1
Ball impact	6.3.3	X									X	1
Gravel impact	6.3.4	X									X	1
Basic test	6.4.2		X	X	X					X		2
Magnetic fields	6.4.3									X		2
Stability	6.4.4		X	X	X					X		2
Sensor number		1	2	3	4	5	6	7	8	9	10	
Immersion	6.4.5		X	X	X							2
Temperature cycling	6.4.6		X	X	X							2
Hammer impact	6.4.7		X	X	X							2
Free fall	6.5.2								X			3
Voltage variation	6.5.3								X			3
Cable protection	6.5.4								X			3
Vibration	6.5.5.1								X			3
Electrical spikes	6.5.5.2						X					3
Electrostatic discharge	6.5.5.3					X						3
Electromagnetic fields	6.5.5.4								X			3

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6.3 Group 1 tests

6.3.1 Test arrangement

The test arrangement shown in figure 2 shall be used for group 1 tests.

The apparatus shall consist of a glass pane 8 mm thick, 2 m high and of sufficient length to permit testing of the sensors at their specified detection range. The glass pane shall be enclosed along three edges by a vertical steel mounting frame.

The mounting frame shall be covered with 10 mm wide and 4 mm thick rubber strips on both sides of the contact area with the glass. The hardness of the rubber shall be (50 ± 10) IRHD in accordance with DIN 53519 Part 2, or equivalent. The three edges of the glass pane shall be clamped firmly in the frame in such a manner that no contact is made between the glass pane and the metal frame.

NOTE – DIN 53519: Part 2 – Testing of elastomers: determination of indentations hardness of soft rubber (IRHD), hardness testing on specimens of small dimensions micro-testing.

Sensors 1 and 10 shall be bonded to the glass pane in accordance with the manufacturer's instructions and using the adhesive specified. They shall be mounted at their specified detection range from the unsupported edge of the glass pane at any vertical position consistent with the manufacturer's specification.