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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Alarm systems – Part 2: Electromagnetic compatibility – Immunity requirements for components of fire and security alarm systems

Systèmes d'alarme – Partie 2: Compatibilité électromagnétique – Exigences relatives à l'immunité des composants des systèmes d'alarme de détection d'incendie et de sécurité

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ALARM SYSTEMS –

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FOREWORD

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International Standard IEC 62599-2 has been prepared by IEC technical committee 79: Alarm and electronic security systems.

This standard is based on EN 50130-4 (1995) and its amendments 1 (1998) and 2 (2003), and integrates the most recent ACEC recommendations[1].

[1] ACEC: Advisory Committee on Electromagnetic Compatibility is an IEC committee.

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

FDIS	Report on voting
79/277/FDIS	79/293/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.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62599 series, under the general title *Alarm systems,* can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

ALARM SYSTEMS –

Part 2: Electromagnetic compatibility – Immunity requirements for components of fire and security alarm systems

1 Scope

This part of IEC 62599 for immunity requirements applies to the components of the following alarm systems, intended for use in and around buildings in residential, commercial, light industrial and industrial environments:

– access control systems, for security applications;
– alarm transmission systems[2];
– CCTV systems, for security applications;
– fire detection and fire alarm systems;
– intruder and hold-up alarm systems;
– social alarm systems.

The tests and severities that should be used are the same for indoor and outdoor applications of fixed, movable and portable equipment.

The levels do not cover extreme cases, which may occur in any location, but with an extremely low probability of occurrence, or in special locations close to powerful emitters (e.g. radar transmitters).

Equipment within the scope of this standard should be designed in order to operate satisfactorily in the environmental electromagnetic conditions of residential, commercial, light industrial and industrial environments. This implies particularly that it should be able to operate correctly within the conditions fixed by the electromagnetic compatibility levels for the various disturbances on the low voltage public supply system as defined by IEC 61000-2-2. The immunity tests in this standard only concern the most critical disturbance phenomena.

For equipment using radio signalling, mains signalling or with connections to the public telephone system, additional requirements, from other standards specific to these signalling media, may apply.

This standard does not specify basic safety requirements, such as protection against electrical shocks, unsafe operation, insulation coordination and related dielectric tests.

This standard does not cover EMC emission requirements. These are covered by other appropriate standards.

2 Normative references

The following referenced documents are indispensable for the application 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.

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2 Apart from equipment which is part of a public telecommunication network.

IEC 60068-1:1988, *Environmental testing – Part 1: General and guidance*
Amendment 1 (1992)

IEC 61000-2-2:2002, *Electromagnetic compatibility (EMC) – Part 2-2: Environment – Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems*

IEC 61000-4-2:2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3:2006, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4:2004, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5:2005, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-6:2008, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-11:2004, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*

ETSI EN 301 489 (all parts), *Electromagnetic compatibility and radio spectrum matters (ERM) – Electromagnetic compatibility (EMC) standard for radio equipment and services*

ETSI EN 300 339, *Electromagnetic compatibility and radio spectrum matters (ERM) – General Electromagnetic compatibility (EMC) for radio communications equipment*

3 Terms, definitions and abbreviations

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

3.1 Terms and definitions

3.1.1
regional product performance standard
regional standard which specifies the product performance requirements

NOTE Such a standard may include EMC requirements but is not limited to EMC requirements. (e.g. series for fire alarm systems, series for intruder alarm systems).

3.1.2
basic EMC standard
standards giving the description of, and test and measurement methods for an EMC phenomenon, along with details of the test apparatus and test set-up

NOTE Although a basic EMC standard may give guidance on the choice of severity, it does not give the prescribed limits or criteria for compliance.

3.1.3
intruder alarm system
alarm system to detect and indicate the presence, entry or attempted entry of an intruder into supervised premises

3.1.4
fire detection and fire alarm system
alarm system to detect the presence of fire in supervised premises and to raise the appropriate alarm

3.1.5
hold-up alarm system
alarm system designed to permit the deliberate creation of an alarm condition in the case of a hold-up

3.1.6
social alarm system
alarm system, providing facilities to summon assistance, for use by persons, who can be considered to be living at risk.

3.2 Abbreviations

EUT : equipment under test

EMC : electromagnetic compatibility

CDN : coupling and decoupling network

CW : continuous wave (carrier wave)

4 Application of tests

The tests shall be carried out as single tests, as described in the following clauses of this standard, and the equipment shall meet the criteria for compliance for each test. If a number of tests are made on a single specimen of the equipment, the sequence of testing is optional and it is permissible to substitute the intermediate functional tests with a reduced version of the functional test and to conduct a full functional test at the end of the sequence. However, it should be noted that, in this case, in the event of a failure, it may not be possible to identify which test exposure caused the failure.

Where appropriate basic EMC standards exist, these are referred to in the relevant clauses. The content of these basic EMC standards (i.e. the description of the test procedure, test apparatus and test set-up) are not repeated here in full. However, modifications or additional information needed for the particular application of the tests are given in this standard.

It may be determined, from consideration of the electrical characteristics and usage of particular equipment, that some of the tests are inappropriate and therefore unnecessary. In such a case, it is required that the decision not to conduct the test be recorded in the report, along with the justification for this decision.

5 Conditions during testing

5.1 Configuration

If the EUT is part of a system, or can be connected to other equipment, then it shall be tested while connected in at least the minimum configuration necessary for verifying its performance.

If the EUT has a large number of inputs/outputs, then a sufficient number shall be selected to simulate actual operating conditions and to ensure that all the different types of inputs/outputs are covered. The connections to inputs and outputs, which may be separated into different cables in a real installation, shall be separated into different cables for the tests (e.g. detector loops).

During conditioning, the EUT shall be monitored to detect any change in its status, including any change in outputs, which could be interpreted by associated equipment as a change in status.

5.2 Environmental conditions

Unless otherwise indicated in the basic standard or test procedure, the tests shall be carried out within the rated supply voltage for the EUT and the following standard atmospheric conditions for measurements and tests, as specified in 5.3.1 of IEC 60068-1:1988.

- temperature: 15 °C to 35 °C;
- relative humidity: 25 % to 75 %;
- air pressure: 86 kPa to 106 kPa.

5.3 Operating condition

Where a relevant regional product performance standard exists which defines suitable operating condition(s) during environmental or EMC tests (e.g. series for fire alarm systems, series for intruder alarm systems), the operating condition(s) of the EUT during the test conditions shall be as defined in that standard.

Where no relevant regional product performance standard exists, the operating condition(s) of the EUT during the test conditioning shall include at least that corresponding to the main functional mode (appropriate to the test being undertaken) of the system of which it forms part (e.g. corresponding to the "set" mode, for an intruder alarm system during a radiated immunity test).

NOTE The configuration and mode(s) of operation during the tests should be precisely noted in the test report.

6 Functional test

The variety and diversity of the equipment within the scope of this standard makes it difficult to define a precise functional test for evaluation of the EUT performance:

- where a relevant regional product performance standard exists which defines a suitable functional test for assessing the performance of the EUT before and after environmental or EMC tests (e.g. series for fire alarm systems, series for intruder alarm systems), the functional test to be applied and its acceptance criteria shall be as defined in that standard;
- where a relevant regional product performance standard does not exist, the functional test shall be at least a test or measurement of the main function(s) of the equipment. The acceptance criteria for this functional test shall be that there is no change in the functioning of the equipment and no significant change in any measurement (e.g. sensitivity of a detector), which shall also remain within specification.

7 Mains supply voltage variations

7.1 Object of the test

To demonstrate the ability of the equipment to function correctly over the anticipated range of mains supply voltage conditions.

7.2 Principle

The test consists of exposing the specimen to each of the maximum and minimum power supply conditions for a sufficient time to obtain temperature stability and to perform the functional test.

7.3 Test procedure

7.3.1 General

No reference can be made to an internationally accepted standard at present.

7.3.2 Initial examination

Before conditioning, subject the specimen to the functional test (see Clause 6).

7.3.3 State of specimen during conditioning

Connect the specimen to suitable power supply, monitoring and loading equipment (see 5.1). The specimen shall be in its operating condition (see 5.3).

7.3.4 Conditioning

Subject the specimen to each of the power supply conditions, indicated in Table 1, until temperature stability is reached.

Table 1

Supply voltage max (U_{max})	U_{nom} [a] + 10 %
Supply voltage min (U_{min})	U_{nom} [a] – 15 %

[a] U_{nom} = Nominal mains voltage. Where provision is made to adapt the equipment to suit a number of nominal supply voltages (e.g. by transformer tap changing), the above conditioning severity shall be applied for each nominal voltage, with the equipment suitably adapted. For equipment which is claimed to be suitable for a range of nominal mains voltages (e.g. 220/240 V) without adaptation, U_{max} = (maximum U_{nom}) + 10 %, and U_{min} = (minimum U_{nom}) – 15 %. In any case the range of U_{nom} shall include the regional nominal mains voltage, e.g. 230 V for Europe.

7.3.5 Measurements during conditioning

Monitor the specimen during conditioning to detect any change in status. When temperature stability has been obtained, at each of the supply conditions, subject the specimen to the functional test (see Clause 6).

7.3.6 Final measurements

After conditioning, for both of the specified power supply conditions inspect the specimen visually for mechanical damage.

7.4 Criteria for compliance

There shall be no damage, malfunction or change of status due to the different supply voltage conditions.

During conditioning, the EUT shall meet the acceptance criteria for the functional test (see Clause 6).

8 Mains supply voltage dips and short interruptions

8.1 Object of the test

To demonstrate the immunity of the equipment to short duration dips (reductions) and interruptions in the a.c. mains voltage, such as those caused by load switching and operation of protection devices on the mains distribution network.

8.2 Principle

The test consists of applying short duration dips and interruptions to the a.c. mains supply to the equipment.

8.3 Test procedure

8.3.1 General

The test apparatus and procedure shall be as described in IEC 61000-4-11.

8.3.2 Initial examination

Before conditioning, subject the specimen to the functional test (see Clause 6).

8.3.3 State of specimen during conditioning

Connect the specimen to a suitable power supply, monitoring and loading equipment (see 5.1). The specimen shall be in its operating condition (see 5.3).

8.3.4 Conditioning

Reduce the a.c. mains supply voltage from the nominal value by the following reductions for the specified periods in accordance with Table 2. The voltage changes shall occur at the zero crossings of the voltage wave.

Table 2

Voltage reduction %	20	30	60	100
Duration of reduction (no. of periods) (i.e. cycles of the voltage wave)	250/300 [a]	25/30 [a]	10/12 [a]	0,5; 1; 250/300 [a]
Number of reductions at each duration	3	3	3	3
Interval between reductions s	≥ 10	≥ 10	≥ 10	≥ 10

[a] The lower number is for 50 Hz testing and the higher number for 60 Hz testing.

8.3.5 Measurements during conditioning

Monitor the specimen during the conditioning period to detect any change in status.

8.3.6 Final measurements

After conditioning, subject the specimen to the functional test (see Clause 6), and inspect it visually for mechanical damage.

8.4 Criteria for compliance

There shall be no damage, malfunction or change of status due to the conditioning. Flickering of an indicator during conditioning is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change.

After conditioning, the EUT shall meet the acceptance criteria for the functional test (see Clause 6).

9 Electrostatic discharge

9.1 Object of the test

To demonstrate the immunity of equipment to electrostatic discharges caused by personnel, who may have become electrostatically charged, touching the equipment or other equipment nearby.

9.2 Principle

The test consists of the application of electrostatic discharges onto parts of the equipment accessible to the operator and onto coupling planes 0,1 m from the equipment. The discharges are generated by apparatus intended to simulate the capacity and discharge resistance of a human body.

9.3 Test procedure

9.3.1 General

The test apparatus and procedure shall be as described in IEC 61000-4-2. The test procedure for type tests performed in laboratories shall be used. For wall and ceiling mounted equipment, follow the procedure for floor standing equipment, but with the equipment arranged with its normal mounting surface 0,1 m from the earth reference plane.

Contact discharges shall be applied to conductive surfaces and the coupling plane(s) and air discharges shall be applied to insulating surfaces. Ten direct discharges shall be applied, at each test voltage to each preselected point, on any part of the specimen, which is normally accessible when in the installed condition or is accessible to the normal operator. Ten indirect discharges shall be applied via the appropriate coupling plane(s).

Unless stated otherwise in a product related standard, surfaces only accessible during infrequent service by the end user or a service engineer (e.g. battery terminals) may be excluded, providing there is an appropriate ESD hazard symbol or warning associated with these surfaces and appropriate ESD mitigation procedures are given in the operating instructions.

9.3.2 Initial examination

Before conditioning, subject the specimen to the functional test (see Clause 6).

9.3.3 State of specimen during conditioning

Connect the specimen to suitable power supply, monitoring and loading equipment (see 5.1). The specimen shall be in its operating condition (see 5.3).

9.3.4 Conditioning

Apply the severity of conditioning indicated in Table 3:

Table 3

Test voltages[a]:	Air discharges	(kV)	2, 4 and 8
	Contact discharges	(kV)	6
Polarity			+ and –
Number of discharges per point for each voltage and polarity			10
Interval between discharges		(s)	≥ 1

[a] The test voltages specified are the open-circuit voltages. Where the test voltages for the lower severity levels are included, they shall also be satisfied.