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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Alarm systems – Intrusion and hold-up systems –
Part 5-3: Interconnections – Requirements for equipment using radio frequency techniques

Systèmes d'alarme – Systèmes d'alarme contre l'intrusion et les hold-up –
Partie 5-3: Interconnexions – Exigences pour les équipements utilisant des techniques radio fréquence

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ALARM SYSTEMS – INTRUSION AND HOLD-UP SYSTEMS –

Part 5-3: Interconnections – Requirements for equipment using radio frequency techniques

FOREWORD

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International Standard IEC 62642-5-3 has been prepared by IEC technical committee 79: Alarm and electronic security systems.

This standard is based on EN 50131-5-3 (2005).

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

FDIS	Report on voting
79/309/FDIS	79/320/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 of the IEC 62642 series can be found, under the general title *Alarm systems – Intrusion and hold-up systems*, 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- withdrawn,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.

INTRODUCTION

This part 5-3 of the IEC 62642 series of standards gives requirements for interconnections equipment using radio frequency techniques used in intrusion and hold-up alarm systems. The other parts of this series of standards are as follows:

Part 1 System requirements
Part 2-2 Intrusion detectors – Passive infrared detectors
Part 2-3 Intrusion detectors – Microwave detectors
Part 2-4 Intrusion detectors – Combined passive infrared / microwave detectors
Part 2-5 Intrusion detectors – Combined passive infrared / ultrasonic detectors
Part 2-6 Intrusion detectors – Opening contacts (magnetic)
Part 2-71 Intrusion detectors – Glass break detectors – Acoustic
Part 2-72 Intrusion detectors – Glass break detectors – Passive
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Part 3 Control and indicating equipment
Part 4 Warning devices
Part 5-3 Interconnections – Requirements for equipment using radio frequency techniques
Part 6 Power supplies
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Part 8 Security fog devices/systems

ALARM SYSTEMS –
INTRUSION AND HOLD-UP SYSTEMS –

Part 5-3: Interconnections –
Requirements for equipment using radio frequency techniques

1 Scope

This part of the IEC 62642 applies to intrusion alarm equipment using radio frequency (RF) links and located on protected premises. It does not cover long range radio transmissions.

This standard defines the terms used in the field of intrusion alarm equipment using radio frequency links as well as the requirements relevant to the equipment.

It is used in conjunction with the other parts of the IEC 62642 series that define the functional requirements of the equipment regardless of the type of interconnections used.

2 Normative references

None.

NOTE Reference to IEC 62642-1 appears only in a Note, as such the reference is indicated in a bibliography at the last page of the present document.

3 Terms, definitions and abbreviations

3.1 Terms and definitions

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

3.1.1
alarm message
message conveying information regarding intruder, tamper or fault alarms

3.1.2
assigned band
frequency band within which the equipment is authorized to operate

3.1.3
attenuation
degradation of the RF signal due to a change in the passive environment of the system after its installation (e.g. creation, relocation or reflection or absorption materials)

3.1.4
collision
simultaneous transmission from two or more RF communication devices belonging to the same system, of sufficient signal strength to cause corruption or obliteration of the RF signals

3.1.5
collision rate
probability of two or more messages having part or all of their information coincident on the RF link leading to a collision

3.1.6
communication link
all local equipment, media and protocols used to route messages

3.1.7
disturbance
event originating internally or externally to the system and liable to impair transmission and/or processing of data in the system

NOTE 1 It can be unintentionally or intentionally harmful.

Causes of disturbance are attenuation, collision, unintentional or intentional message substitution and other RF interference.

NOTE 2 The different effects which disturbances may have on the signals are

– no corruption of the RF signal,
– corruption of the RF signal with no message corruption,
– corruption of the RF signal with partial message corruption,
– total obliteration of the RF signal (inability to receive).

3.1.8
failure of periodic communication
inability to pass a message on an RF link

3.1.9
identification code
part of a message used to identify a transmitting RF communication device belonging to the system

3.1.10
intentional message substitution
deliberate transmission from an RF communication device using the correct protocol with the intention of reducing the security of the system

3.1.11
message authentication
exchange of codes to validate the uniqueness of a transmitting device to a receiving device

3.1.12
monitoring message
message used to check the integrity of the communication link

3.1.13
RF interference
RF emission from any other source, that may cause corruption or obliteration of wanted signals and do not conform to the definition of collision or message substitution

3.1.14
RF communication device
device using RF transmission links

3.1.15
throughput ratio
ratio of the total number of messages sent by the transmitting device to the total number of messages correctly interpreted by the receiving device

3.1.16
unintentional message substitution
non-deliberate transmission from an RF communication device using the correct protocol emanating from another system with no intention of reducing the security

3.2 Abbreviations

For the purposes of this document, the following abbreviations apply.

ATE alarm transmission equipment

CIE control and indicating equipment

RF radio frequency

RL reference level

TL transmitted level

WD warning device

4 General requirements

4.1 Immunity to attenuation

Due to the fact there may be changes in the passive environment after installation, it shall be possible to temporarily attenuate the RF link during installation or maintenance according to the values given in Table 1.

The manufacturer shall specify the means used on its equipment to fulfil this requirement.

Table 1 – Immunity to attenuation

	Attenuation
Grade 1	3 dB
Grade 2	6 dB
Grade 3	9 dB
Grade 4	12 dB

NOTE Grades are defined in IEC 62642-1.

4.2 Immunity to collision

4.2.1 Requirement for collision rate

The objective of the requirement for collision rate is to ensure a high level of confidence in the transmissions of alarm and monitoring messages thus reducing the probability of equipment on the same system causing interference by design and possibly leading to loss or corruption of information. To keep the collision rate as small as possible, the following requirements given in Table 2 shall be fulfilled.

Table 2 – Equipment occupation of the medium

	Maximum occupation (percentage)	In a period of time of
Grade 1	10 %	240 min
Grade 2	10 %	120 min
Grade 3	10 %	100 s
Grade 4	10 %	10 s

In addition, all regulatory requirements concerning the duty cycle shall be complied with. To ensure successful transmissions for grade 3 and 4 equipment, all types of messages (i.e. alarm, monitoring, etc) shall be acknowledged by the receiving equipment to the transmitting equipment. In the case of one alarm message colliding with one monitoring message, the alarm information shall in any case be received in less than 10 s.

4.2.2 Requirement for throughput ratio

The objective of this requirement is to measure the ability of the receiving equipment to accurately interpret and execute correct alarm messages.

Receiving equipment shall comply with the requirements of Table 3.

Table 3 – Throughput ratio

	Minimum number of correctly interpreted messages
Grade 1	999 out of 1 000
Grade 2	999 out of 1 000
Grade 3	9 999 out of 10 000
Grade 4	9 999 out of 10 000

4.3 Immunity to unintentional and intentional component and message substitution

Intentional message substitution generally attempts to reduce the security of the system primarily by falsely unsetting it. Unintentional message substitution generally causes false alarms or tamper alarms and has a nuisance value.

In order to prevent both unintentional and intentional message substitution, each transmitting device shall be identified as belonging to the system by an identification code. The number of identification code possibilities shall be at least equal to those shown in Table 4.

Table 4 – Identification codes

	Identification codes
Grade 1	100 000
Grade 2	1 000 000
Grade 3	10 000 000
Grade 4	100 000 000

4.3.1 Immunity to unintentional and intentional components substitution

For grade 4 equipment, the CIE shall have means to detect substitution.

4.3.2 Immunity to intentional message substitution

To decrease the risk of intentional message substitution, the equipment shall fulfil a requirement given by the probability for an intruder to discover the identification code in less than one hour. The requirements are shown in Table 5.

Table 5 – Message substitution

	Probability lower than
Grade 1	5 %
Grade 2	1 %
Grade 3	0,5 %
Grade 4	0,05 %

For grade 3 and grade 4 equipment, the receiving equipment shall have message authentication.

4.4 Immunity to interference

The purpose of this requirement is to check the ability of the receiving equipment to discriminate between the desired signal and the interfering RF signals.

This immunity to interference requirement applies to all RF receiving equipment. Each of the interference signals defined below shall be applied and shall not cause false alarms or an indication of a failure of periodic communication.

During continuous application of the interfering signals whose levels are defined in subsequent clauses, all of the 20 system relevant messages (sent by the transmitting equipment used for test purposes) shall be correctly received and processed by the receiving equipment.

4.4.1 Interference outside of the assigned band for grades 1 and 2 equipment

The receiving equipment shall be fully functional when the level of interference (defined as Level B in Annex C) is applied at frequency F_1 as stated in 4.4 and subsequently at frequency F_2 and according to the values of Table 6.

F_1 equals (F_{min} – 5 % F_{min}) where F_{min} is the lowest frequency used by the equipment in the assigned band and F_2 (F_{max} + 5 % F_{max}) where F_{max} is the highest frequency used by the equipment in the assigned band.

In the event of the receiving equipment operating in more than one assigned band, the requirement shall be fulfilled for each individual assigned band.

Table 6 – Interference outside of the assigned band for grades 1 and 2

	F_1 Level B	F_2 Level B
Grade 1	10 V/m	10 V/m
Grade 2	10 V/m	10 V/m

4.4.2 Interference within the assigned band for grades 1 and 2 equipment

The receiving equipment shall be fully functional when the level of interference (defined as Level C in Annex C) is applied to a test frequency known as F_t and according to the values of Table 7:

a) for receiving equipment using a single frequency known as F_w, F_t shall be equal to F_w;

b) for receiving equipment using two or more separate frequencies in the same assigned band, F_t shall be equal to $(F_{min} + F_{max}) / 2$, where F_{min} is the lowest frequency used by the equipment and F_{max} is the highest frequency used by the equipment in the assigned band;

c) for receiving equipment using one or more separate frequencies in separate assigned bands, the test shall be conducted separately for each assigned band.

Table 7 – Interference within the assigned band for grades 1 and 2

	F_t Level C
Grade 1	(Level A) – 12 dB
Grade 2	(Level A) – 12 dB
NOTE Level A is defined in 5.1.6.2.	

4.4.3 Interference for grades 3 and 4

The receiving equipment shall be fully functional when the level of interference (defined as Level D in Annex C) is applied separately at F_t, F_1 and finally F_2, where F_t is as defined in 4.4.2, and F_1 and F_2 are as defined in 4.4.1 and according to the values given in Table 8.

Table 8 – Interference for grades 3 and 4

	F_t Level D	F_1 Level D	F_2 Level D
Grade 3	10 V/m	10 V/m	10 V/m
Grade 4	10 V/m	10 V/m	10 V/m

4.5 Requirement for RF links monitoring

RF links monitoring shall be performed by all receiving equipment. The RF links shall be monitored in accordance with the grade. The indication or notification is dependent on the grade and the state of the equipment and the type of disturbances detected by the monitoring function.

The following disturbances shall be detected: failure of periodic communication and interference.

4.5.1 Requirement for the detection of a failure of periodic communication

The RF receiving equipment (CIE or ATE) shall report and identify a failure of periodic communication with a transmitting device of the system within the time periods specified in Table 9.

Table 9 – Periodic communication

	By CIE from detector	By CIE from WD	By CIE from ATE	By ATE from CIE
	Periods			
Grade 1	240 min	240 min [a]	240 min [a]	240 min
Grade 2	120 min	120 min [a]	120 min [a]	120 min
Grade 3	100 s	100 s	100 s	100 s
Grade 4	10 s	10 s	10 s	10 s
[a] This requirement is optional for this grade.				

In the event of a failure of periodic communication as defined in Table 9, a fault or tamper signal shall be generated for grades 1 and 2 equipment and a tamper signal shall be generated for grades 3 and 4 equipment.

In grades 1, 2, 3 and 4, setting shall be prevented when the last periodic communication message from any transmitting equipment exceeds the period specified in Table 10.

Table 10 – Periodic communication before setting

	Period
Grade 1	60 min
Grade 2	20 min
Grade 3	100 s
Grade 4	10 s

Portable equipment need not conform to the requirements given in Table 9 and Table 10.

4.5.2 Requirement for the detection of interference

If the level of interference is great enough to corrupt the correct transmissions between equipment, detection of interference shall take place when the levels of interference are detected for time periods as specified in Table 11.

Table 11 – Detection of interference

	Detection of interference (maximum)
Grade 1	Sum total of 30 s of interference signal in any 60 s
Grade 2	Sum total of 30 s of interference signal in any 60 s
Grade 3	Sum total of 10 s of interference signal in any 20 s
Grade 4	Sum total of 10 s of interference signal in any 20 s

For all grades, where the interference detected is less than 5 s in any period of 60 s, there shall be no indication or notification. For grade 1 and 2 equipment fulfilling the requirement of grade 3 and 4 equipment as defined in 4.4.3, it is permissible to have an indication or notification for a time between 5 s and the times specified in Table 11.

In the event of detection of interference as defined in Table 11, a fault or tamper signal shall be generated for grades 1 and 2 equipment and a tamper signal shall be generated for grades 3 and 4 equipment.