BS EN 50131-5-3:2017

BSI Standards Publication

Alarm systems — Intrusion systems

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

bsi.

National foreword

This British Standard is the UK implementation of EN 50131-5-3:2017. It supersedes BS EN 50131-5-3:2005+A1:2008 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GW/1, Electronic security systems.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Published by BSI Standards Limited 2017

ISBN 978 0 580 91845 2

ICS 13.310

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 March 2017.

Amendments/corrigenda issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 50131-5-3

March 2017

ICS 13.310

Supersedes EN 50131-5-3:2005

English Version

Alarm systems - Intrusion systems - Part 5-3: Requirements for interconnections equipment using radio frequency techniques

Systèmes d'alarme - Systèmes d'alarme contre l'intrusion - Partie 5-3: Exigences pour les équipements d'interconnexion utilisant des techniques radio

Alarmanlagen - Einbruch- und Überfallmeldeanlagen - Teil 5-3: Anforderungen an Übertragungsgeräte, die Funkfrequenz-Techniken verwenden

This European Standard was approved by CENELEC on 2016-11-14. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Figures

Tables

European foreword

This document (EN 50131-5-3:2017) has been prepared by CLC/TC 79 “Alarm systems”.

The following dates are fixed:

• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2017-09-17
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2020-03-17

This document supersedes EN 50131-5-3:2005.

This document is bound to be used in conjunction with the other parts of the EN 50131 series that define the functional requirements of the equipment regardless of the type of interconnections used.

EN 50131-5 is currently composed with the following parts:

— CLC/FprTS 50131-5-1 *Alarm systems — Intrusion systems — Part 5-1: Interconnections — Requirements for wired Interconnection for I&HAS equipments located in supervised premises*;

— EN 50131-5-3, *Alarm systems — Intrusion systems — Part 5-3: Requirements for interconnections equipment using radio frequency techniques*;

— CLC/TS 50131-5-4, *Alarm systems — Intrusion and hold-up systems — Part 5-4: System compatibility testing for I&HAS equipments located in supervised premises*.

1 Scope

This European Standard applies to intrusion alarm equipment using radio frequency (RF) links and located on protected premises. It does not cover long-range radio transmissions.

This European 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.

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 50131-1:2006, *Alarm systems - Intrusion and hold-up systems - Part 1: System requirements*

EN 50131-3, *Alarm systems - Intrusion and hold-up systems - Part 3: Control and indicating equipment*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purpose 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

EXAMPLE Creation, relocation or reflection or absorption materials.

3.1.4
collision
simultaneous transmissions 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 probability
likelihood 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 RF equipment, media and protocols used to route alarm system 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 to entry: It can be unintentionally or intentionally harmful.

Note 2 to entry: Causes of disturbance are attenuation, collision, unintentional or intentional message substitution and other RF interference.

Note 3 to entry: The different effects that disturbances may have on the signals are:

— 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 communication
inability to pass a message on an RF link

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

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

3.1.11
RF interference
RF emissions 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

3.1.12
RF communication device
device using RF transmission links

3.1.13
relaying equipment
device that receives RF messages from one or more devices and transmits them to another receiving device of the alarm system either directly or through other relaying equipment

3.1.14
throughput ratio
ratio of the total number of messages correctly interpreted by the receiving device to the total number of messages sent by the transmitting device

3.1.15
unintentional message substitution
non-deliberate transmissions from an RF communication device using the correct protocol originating from another system with no intention of reducing the security

EXAMPLE Alarm system of same manufacturer and type installed in the neighbourhood, which could negatively interfere by its normal operation

3.2 Abbreviated terms

For the purpose of this document, the following abbreviated terms apply:

ACE ancillary control equipment

CIE control and indicating equipment

EUT Rx receiving equipment under test

EUT Tx transmitting equipment under test

RE relaying equipment

RF radio frequency

RL reference level

SPT Supervised premises transceiver

WD warning device

4 Requirements

4.1 General

Components of IAS with usage of RF links shall comply with the following requirements.

4.2 Immunity to attenuation

4.2.1 General

Due to the fact that there may be changes in the passive environment after installation, it shall be possible to temporarily reduce or simulate the reduction of the RF link budget during installation or maintenance.

4.2.2 Requirement for immunity to attenuation

The manufacturer shall specify in the installation and maintenance documentation the means used on its equipment to fulfil this requirement.

This function shall be automatically activated by the system itself when the system is in maintenance or installation mode.

In this installation condition, the reduction shall be according to the values given in Table 1. This applies to all links e.g. to CIE, RE, SPT and WD.

Table 1 — Immunity to attenuation

	Reduction of the RF link budget
Grade 1	≥ 8 dB
Grade 2	≥ 8 dB
Grade 3	≥ 15 dB
Grade 4	≥ 15 dB
NOTE The requirements given in Table 1 do not apply to portable devices (e.g. key fob)	

4.3 Immunity to collision

4.3.1 General

The objective of the requirement and the process of decoding 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.

4.3.2 Requirement for occupation rate

To keep the occupation rate as small as possible, the following requirements given in Table 2 shall be fulfilled. This rate shall be calculated by assuming the system is at its full capacity.

Table 2 — System 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

To ensure successful transmissions for grade 3 and grade 4 equipment, all types of messages (e.g. alarm, monitoring) shall be acknowledged by the receiving equipment to the transmitting equipment.

4.3.3 Requirement for throughput ratio

The objective of this requirement is to measure the ability of all receiving equipment to interpret and decode radio messages accurately.

Receiving equipment shall comply with the requirements of Table 3.

Table 3 — Throughput ratio

	Minimum number of correctly interpreted messages
All grades	999 out of 1 000

4.4 Immunity to substitution

4.4.1 General

Intentional message or component substitution generally attempts to reduce the security of the system. Unintentional message or component substitution generally causes false alarms or tamper alarms and has a nuisance value.

4.4.2 Immunity to unintentional message and component substitution

In order to prevent unintentional message and component 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

Alternatively the manufacturer shall provide means to the installer on site to choose identification code with the minimum of 256 codes to ensure that an alarm shall not interfere with other nearby systems.

4.4.3 Immunity to intentional messages and components substitution

In accordance with EN 50131-3 for grade 4 equipment, means to monitor and to detect messages and components substitution are required.

4.5 Immunity to interference

4.5.1 General

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 the receiving equipment as listed below:

— CIE;

— WD;

— RE;

— SPT.

Each of the interference signals defined below shall be applied and shall not cause false alarm, indications of a failure of periodic communication and shall not compromise the correct reception and processing of the messages.

During continuous application of the interfering signals whose levels are defined in the subsequent subclauses, 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.

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

4.5.2 Interference outside the assigned band for equipment of all grades

The receiving equipment shall be fully functional during the application of the interference signal at a level of 10 V/m at frequency F_1 and subsequently at frequency F_2 (F_1 and F_2 are defined in 5.5.1).

4.5.3 Interference within the assigned band for equipment of all grades

The receiving equipment shall be fully functional during the application of the interference signal at a level of RL + 8 dB (RL is defined in 5.1) at frequency F_t (F_t is defined in 5.5.1).

4.5.4 Interference within the assigned band for grade 3 and grade 4 equipment

Additionally, the receiving equipment shall be fully functional when an interference signal is applied to each assigned band sequentially at a level, IL + 3 dB (IL is defined in 5.5.4) with a frequency modulated signal as defined in 5.5.4.

4.6 Requirement for RF links monitoring

4.6.1 General

The RF links shall be monitored in accordance with the grade. The indication or notification related to RF link monitoring is dependent on the grade and the state of the equipment.

4.6.2 Requirement for the detection of a failure of periodic communication

A failure of periodic communication shall be detected for any type of device within the time periods as specified in EN 50131-1:2006, subclause relating to Verification of periodic communication. In the case of a failure of communication to and from a WD or to and from an SPT, the annunciation of the failure shall be processed (optional for grade 1 and grade 2).

In the event of a failure of periodic communication, a fault or tamper shall be generated in accordance with EN 50131-1, clause relating to Signals and messages to be generated.

NOTE This requirement does not apply to portable devices (e.g. key fob).

4.6.3 Requirement for periodic communication before setting

Setting shall be prevented in accordance with EN 50131-1, clause relating to Verification during setting procedure.

These requirements do not apply to wire-free ACE (e.g. keyfob or portable remote control).

4.6.4 Requirement for the detection of interference

If the level of modulated interference is great enough to corrupt the correct transmissions between equipments, detection of interference shall take place when such levels are detected for time periods as specified in Table 5.

Table 5 — Detection of interference timings

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

For all grades, when modulated interference with:

— a level equal to IL (IL is defined in 5.6.3) permanently applied, no indication or notification other than those specified in EN 50131-1, clause relating to signals or messages to be generated, shall take place; and

— a level as given in Table 7 and a duration less than 5 s, no indication or notification shall take place.

In the event of detection of modulated interference with a level as given in Table 7 and duration as given in Table 5, a fault or tamper shall be generated for grade 1 and grade 2 equipment and a tamper shall be generated for grade 3 and grade 4 equipment.

The requirements given in Table 5 do not apply to wire-free ACE (e.g. key fob or portable remote control).

According to the grade of the system, the following requirements given in Table 6 for interference detection apply.

Table 6 — Detection of interference

	System state	CIE/RE	WD	SPT
		Detection of interference		
Grade 1	At all times	Mandatory	Optional [a]	Optional
Grade 2	At all times	Mandatory	Optional [a]	Optional
Grade 3	At all times	Mandatory	Mandatory	Mandatory
Grade 4	At all times	Mandatory	Mandatory	Mandatory
[a] For external devices, if this function is provided, the WD shall conform to the requirement for detection of interference				

The receiving equipment shall detect a level of interference as defined in Table 7, for the durations as defined in Table 9.

Table 7 — Level of interference signal

Grade 1	IL + 40 dB
Grade 2	IL + 30 dB
Grade 3	IL + 9 dB
Grade 4	IL + 9 dB

The requirements given in Table 5, Table 6, and Table 7 apply to CIE, WD, RE and SPT.

4.7 Antenna

4.7.1 General

The antenna shall have the same stability and tamper protection as required for the device.

4.7.2 Requirements for antenna

For all grades equipment where antennas and/or an antenna cable is accessible at access level 1 the requirements given in Table 8 shall be fulfilled.

Table 8 — Requirements for antenna

	Degrading of antenna performance
CIE and RE	Indicate fault and prohibit setting
WD	Local notification by device
SPT	Automatic transmission of tamper alarm

For grade 3 and grade 4 equipment, antenna and/or an antenna cable shall fulfil the same tamper protection requirements as those of the device using this antenna.

5 Tests

5.1 General

5.1.1 For these tests, the manufacturer shall provide one system made of the receiving equipment to be tested (EUT Rx) with one or more transmitting equipment (EUT Tx) and remote control equipment. The equipment can be modified in order to trigger easily RF alarm messages and to advise easily the operator when an alarm message is processed.

5.1.2 Determination of reference level RL

For most of the tests, the receiving equipment shall be set in a receiving state that just ensures a good reception. The level of this receiving state – measured on the spectrum analyser according Annex A – is called the reference level (RL).

The reference level RL of the EUT Rx shall be determined and used as the basis for all other tests.

This measurement shall be conducted using the arrangement shown in Annex A.

The signal generator for the wanted signal is appropriately modulated to simulate a transmitted signal or an actual transmitting device may be used, via an attenuator to control the RF level. If using a real device, care shall be taken to ensure adequate isolation so that when the attenuator is set to maximum, the receiver will not receive the transmitting device through leakage between cables and connectors.

The measurement of RL level shall be performed in the conditions (antenna polarization and EUT Rx orientation) where the EUT Rx receives the maximum signal. The interference signal source amplifier shall be turned ON when determining RL for immunity to interference tests (5.6) and can be turned OFF for other tests.

To determine the reference level (RL) the wanted signal level is set at a point at which messages are received reliably and subsequently attenuated in appropriate steps until fewer than 80 % of alarm messages are received. Then decrease the attenuation in finer steps (e.g. 1 dB or 0,1 dB) until 80 % to 90 % of alarm messages are received. If this range is not achievable due to technical radio performance reasons then the nearest figure close to the range shall be used. In any case, this shall be not less than 80 %.

When this point is reached, the wanted signal level is increased by 3 dB and this level is the reference level (RL).

EXAMPLE When the value observed on the spectrum analyser is - 80 dBm, the reference level is - 80 dBm + 3 dB = - 77 dBm.

5.2 Test for immunity to attenuation

The test method used to determine the reference level shall be used to check the attenuation of RF link function as specified in 4.1. For the purpose of this test, the equipment shall be configured as indicated in the manufacturer’s installation or maintenance specification.

a) The suitable arrangement is shown in Annex A.

b) Measure in dBm the RL of the EUT Rx under normal operating conditions (RLn).

c) Measure in dBm the RL of the EUT Rx in installation mode (RLi).

Pass/Fail criterion: the test is passed if RLi - RLn is greater than or equal to the relevant figure for ‘attenuation’ given in Table 1.

Where the manufacturer claims compliance with 4.1 by a method other than attenuation at the receiver, this method shall be specified by the manufacturer and an appropriate test method shall be agreed with the test house.

5.3 Verification of immunity to collision

5.3.1 Calculation of the occupation rate

The occupation rate for any given system shall be calculated as a derivative of the maximum number of communicating devices (according to the manufacturer's specifications) duration and number of monitoring, acknowledgement and status transmissions. In this calculation, it shall be taken into account that messages are repeated up to the maximum number of time. If acknowledgement is sent, it shall be part of the calculation.

The manufacturer shall provide the calculations on which it claims compliance with the requirements of 4.2.1.

Pass/Fail criterion: The equipment passes the test if the calculated maximum occupation is lower than or equal to the values as specified in Table 2.

NOTE Example for the calculation is given in Annex C.

5.3.2 Test for throughput ratio

The test shall be conducted in a shielded anechoic chamber. The manufacturer shall provide the means for ensuring the transmission of the requisite number of alarm messages.

The alarm message transmission rate shall be specified by the manufacturer and agreed by the test house and shall be at least 5 alarm messages per minute (manufacturer may modify the EUT in order to comply with this test condition).

a) The receiving equipment/transmitting equipment combination shall be configured to the reference level as determined in 5.1, increased by 6 dB.

b) The number of transmissions shall be counted. The arrangement shall not interfere with the transmitting equipment output.

c) The number of received and decoded messages shall be counted. The arrangement shall not interfere with the receiving equipment input.

Pass/Fail criterion: The equipment passes the test if the number of alarm messages correctly received and decoded as specified in Table 3.

5.4 Tests for immunity to substitution

5.4.1 Test for immunity to unintentional messages and components substitution

The manufacturer shall provide information demonstrating the method of compliance with Table 4 or with the alternative method.

A technical assessment shall be carried out to verify the requirements.

Pass/Fail criterion: The test is passed if the number of identification codes comply with Table 4 or with the alternative method.

5.4.2 Test for immunity to intentional messages and components substitution

In addition, for grade 4 equipment, the manufacturer shall provide information demonstrating the method to monitor and detect component and message substitution..

Pass/Fail criterion: The test is passed if the provided information proof that substitution is monitored and detected.

5.5 Tests for immunity to interference

5.5.1 General

The equipment shall be arranged as shown in Annex A.

For the purposes of interference testing, three frequencies, F_1, F_2 and F_t, are defined as follows:

$$F_1 = 0,95 \text{ x } F_{min}$$

$$F_2 = 1,05 \text{ x } F_{max}$$

where

F_{max} is the highest frequency used by the equipment in the assigned band;

F_{min} is the lowest frequency used by the equipment in the assigned band;

F_t is the test frequency

5.5.2 Test for interference outside of the assigned band (for all grades)

The tests consist of subjecting the receiver to a continuous interference signal introduced from a signal generator.

Before the interference signal is applied, the EUT Rx shall be set to the reference level (RL) condition.

The wanted signal attenuation shall be reduced such that the observed signal on the spectrum analyser is RL + 20 dB.

The unmodulated interfering signal shall be adjusted at frequency F_1 with a level of 10 V/m (RMS). The field strength shall be measured using a field strength probe.

During the interfering signal adjustment, the EUT Rx may be temporarily removed and the field strength probe introduced in its place.

Then the modulated interference signal shall be applied. This signal shall be 80 % amplitude modulated by a 1 kHz sine wave (1.8 peak to RMS-ratio). Twenty messages are sent by the transmitting device used for test purposes.

The test shall be conducted for both horizontal and vertical polarization.

The test shall be repeated for each frequency F_1 and F_2 of each assigned band used by the receiving equipment.

The level of the interference signal shall be readjusted at 10 V/m for each frequency and polarization.

Pass/Fail criterion: The EUT Rx has passed the test if it has correctly processed all of the 20 messages sent by the transmitting device used for test purposes and if no failure or tamper message is generated.

5.5.3 Test for interference within the assigned band for equipment of all grades

The manufacturer shall provide documentation about the used frequencies.

Each used frequency shall be tested by the following procedure.

1) Before the interference signal is applied, the EUT Rx shall be set to the reference level (RL) condition. Wanted signal attenuation shall be reduced such that the observed signal on the spectrum analyser is RL + 20 dB.

2) Set the interference generator (F_t) to one of the used frequencies.

3) Adjust the interference signal to the level RL + 8 dB.

4) Apply modulation 80 % amplitude modulated by 1 kHz sine wave (1.8 peak to RMS ratio).

5) 20 messages are sent by the transmitting device used for test purposes.

6) Repeat this procedure (steps 2 to 5) for all used frequencies.

NOTE The interference signal generator is connected directly to the coupler in place of the 50 Ω load.

Pass/Fail criterion: The EUT Rx/Tx has passed the test if it has correctly processed all messages sent by the transmitting device used for test purposes and if no failure or tamper message is generated.

5.5.4 Test for interference within the assigned band for grade 3 and grade 4 equipment

The arrangement shown in Annex A shall be used; the interference signal generator is connected directly to the coupler in place of the 50 Ω load.

The tests consist of subjecting the receiver to a continuous interference signal introduced from a signal generator. This signal shall cover at least the entire assigned band (not affecting other used bands). For that, a frequency-modulated signal shall be used, with a deviation greater than the assigned band and the modulating signal shall be a 15kHz ramp (see details in Annex B).

1) Before the interference signal is applied, the EUT Rx shall be set to the reference level (RL) condition. Wanted signal attenuation shall be reduced such that the observed signal on the spectrum analyser is RL + 20 dB.

2) The level of interference generated by the interfering transmitting equipment shall be increased until 2 or more alarm messages out of 5 generated by the standard transmitting equipment, are not received by the receiving equipment. This level of the interference signal of the interfering transmitting equipment, measured on the spectrum analyser, is called level IL.

3) Increase that level by 3 dB.

4) 20 messages are sent by the transmitting device used for test purposes.

5) Repeat this procedure (steps 2 to 5) for all used bands.

Pass/Fail criterion: The EUT Rx/Tx has passed the test if it has correctly processed all messages sent by the transmitting device used for test purposes and if no failure or tamper message is generated.

5.6 Tests for RF link monitoring

5.6.1 Tests for the detection of a failure of periodic communication on a link

For each combination of equipment, the receiving equipment listed below shall be evaluated:

— CIE from detector;

— CIE from WD;

— WD from CIE;

— SPT from CIE;

— CIE from SPT.

NOTE RE could be part of the link between the components.

It shall then be verified that monitoring signals or messages are correctly received by the receiving equipment according to the specification provided by the manufacturer.

The power supply of the transmitting equipment shall be disconnected to interrupt any transmissions or the transmissions shall be interrupted.

In the latter case, the use of a shielded anechoic chamber as shown in Annex A may be appropriate.

Where the CIE is included in the test, it shall be in the unset state.

Pass/fail criterion: The receiving equipment shall generate a fault or a tamper in accordance with the times required in EN 50131-1, Clause relating to Verification of periodic communication.

5.6.2 Periodic communication before setting

In the unset condition of the system, the power supply of the transmitting equipment shall be disconnected to interrupt any transmissions or the transmissions shall be interrupted.

In the latter case, the use of a shielded anechoic chamber as shown in Annex A may be appropriate.

Following the elapsed time period for the particular grade as specified in EN 50131-1, clause relating to Verification during setting procedure, commence the system setting procedure within 10 s.

Pass/fail criterion: It shall not be possible to set the system.

5.6.3 Tests for detection of interference

The tests consist of subjecting the receiver to a continuous modulated interference signal introduced from a signal generator. This signal shall cover the entire assigned band.

The equipment shall be arranged as shown in Annex A. Before the interference signal is applied, the EUT Rx shall be set to the reference level (RL) condition.

Wanted signal attenuation shall be reduced such that the observed signal on the spectrum analyser is RL + 6 dB.

A continuous interference signal shall be introduced from the interference generator. This signal shall cover at least the entire assigned band. For that, a frequency-modulated signal shall be used, with a deviation greater than twice of the assigned band and the modulating signal shall be a 15kHz ramp (see details in Annex B).

In the case of equipment using more than one band, the above test shall be performed in all the assigned bands separately with the other assigned bands disabled during the test (the means shall be provided by the manufacturer).

The level of interference generated by the interfering transmitting equipment shall be increased until 2 or more alarm messages out of 5 generated by the standard transmitting equipment, are not received by the receiving equipment.

This level of the interference signal of the interfering equipment, measured on the spectrum analyser, is called Level IL.

The transmission of the standard transmitting equipment shall be stopped and the level of the interference generated by the interfering equipment shall be increased to the values given in Table 7.

Pass/fail criterion: The test is passed when the following test sequences have been completed:

a) the application of a continuous interference signal equal to IL shall not generate indication or notification other than those specified in 4.6.4;

b) the application of interference signals with the level defined in Table 7 up to 5 s shall not generate any notification or indication;

c) the application of interference signals with the level defined in Table 7 for a duration defined in Table 9 shall generate a fault or tamper signal as required in 4.6.4 c).”

Table 9 — Duration of interference signals

	Sum of duration of signal(s)
Grade 1	31 s
Grade 2	31 s
Grade 3	11 s
Grade 4	11 s

5.7 Test for antenna

For each type of equipment defined in Table 8, configure the equipment in its normal condition.

Where the antenna and/or the antenna cable is accessible at access level 1, remove or cut the antenna and/or the antenna cable and verify the requirements are achieved as defined in Table 8.

Pass/Fail criterion: The test is passed if indication or notification is observed in less than 10 s after antenna tamper.

Annex A
(normative)

Test setup

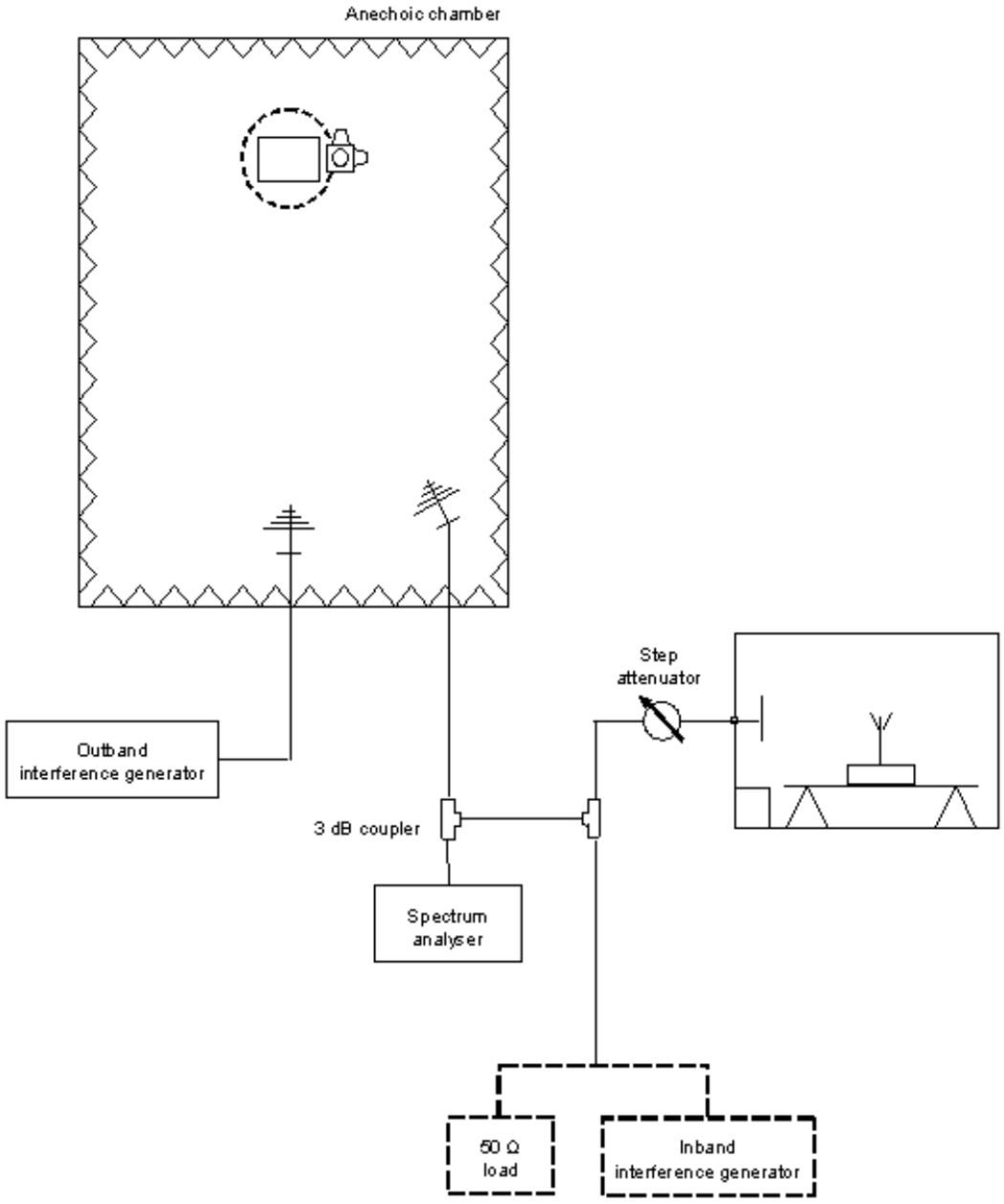

Figure A.1 — Test setup

Annex B
(informative)

Interference signal

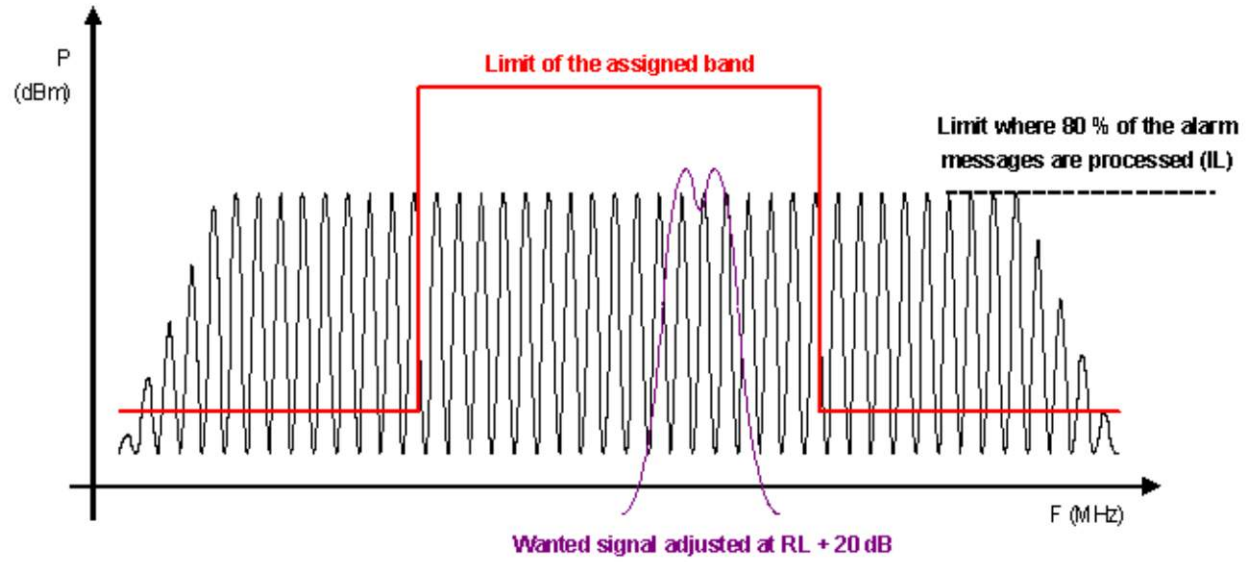

Figure B.1 — Level IL

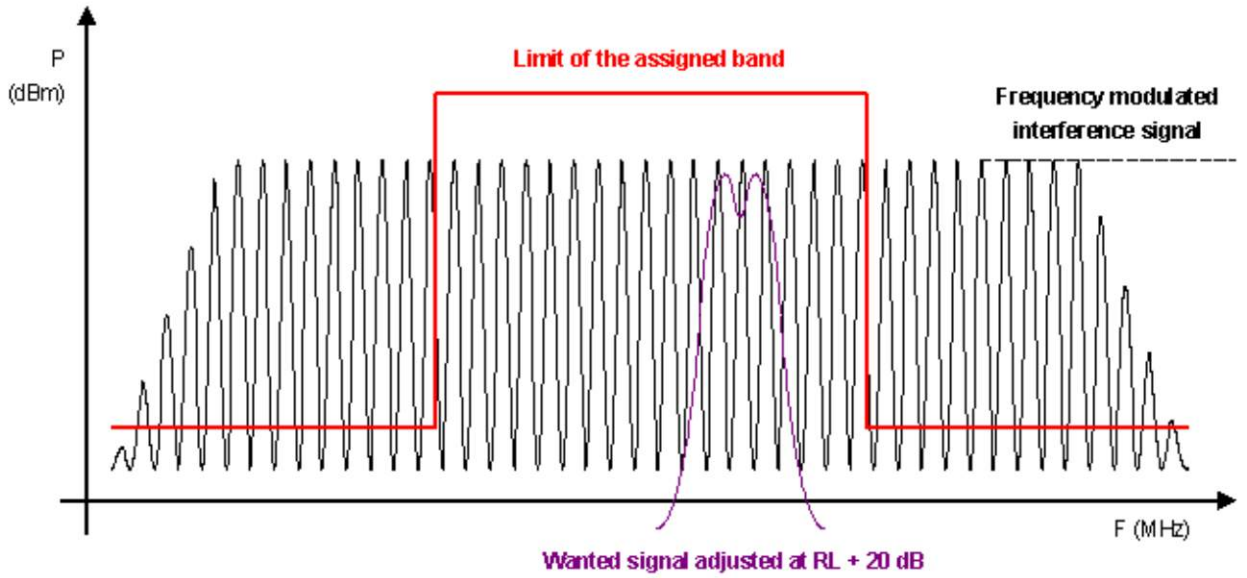

Figure B.2 — Interference signal

Annex C
(informative)

Example for the calculation of occupation rate

Table C.1 — Example for the calculation of occupation rate

Kind of transmitter	Maximum number of transmitter within one system	Duration of one monitoring message ms	Repetition	Duration of one acknowledgement message ms	Number of messages sent per period	Duration ms
Monitoring / status messages by the CIE						
Detectors	36	10	3	5	12	36 × (((10 x 3) + 5) x 12) = 15 120
Keypad	1	10	3	5	12	1 × (((10 × 3) + 5) × 12) = 420
Warning device	1	10	3	5	12	1 × (((10 × 3) + 5) × 12) = 420
Alarm transmitting equipment	1	10	3	5	12	1 × (((10 × 3) + 5) × 12) = 420
Relay equipment	0	-	-	-	-	-
Monitoring / status messages by the SPT						
CIE	1	10	3	5	12	1 × (((10 × 3) + 5) × 12) = 420
					Total duration	16 800 (16,800 s)
					Occupation ratio	16,800 / 7 200 = 0,002 333 (0,23 %)

For this example, the following presumptions have been taken into account:

a) The system is a grade 2 system, thus the observation period is 2 h (7 200 s);

b) The system is at its maximum capacity; the maximum number of peripherals is 40 components (1 CIE, 36 detectors, 1 keypad, 1 warning device and 1 transmitting equipment);

c) The duration of one monitoring message is 10 ms. Monitoring messages are repeated up to 3 times (until they are acknowledged);

d) The acknowledgement is sent at the last repetition. The duration of one acknowledgement is 5 ms;

e) Peripherals (detectors, keypads, warning devices and transmitting equipments) send their monitoring messages every 10 min (12 per observation period);

f) For this system:

   1) the CIE monitors detectors, keypads, warning devices and transmitting equipments;

   2) the alarm transmitting equipment monitors the CIE.

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Copyright in BSI publications

All the content in BSI publications, including British Standards, is the property of and copyrighted by BSI or some person or entity that owns copyright in the information used (such as the international standardization bodies) and has formally licensed such information to BSI for commercial publication and use.

Save for the provisions below, you may not transfer, share or disseminate any portion of the standard to any other person. You may not adapt, distribute, commercially exploit, or publicly display the standard or any portion thereof in any manner whatsoever without BSI's prior written consent.

Storing and using standards

Standards purchased in soft copy format:

- A British Standard purchased in soft copy format is licensed to a sole named user for personal or internal company use only.
- The standard may be stored on more than 1 device provided that it is accessible by the sole named user only and that only 1 copy is accessed at any one time.
- A single paper copy may be printed for personal or internal company use only.

Standards purchased in hard copy format:

- A British Standard purchased in hard copy format is for personal or internal company use only.
- It may not be further reproduced – in any format – to create an additional copy. This includes scanning of the document.

If you need more than 1 copy of the document, or if you wish to share the document on an internal network, you can save money by choosing a subscription product (see 'Subscriptions').

Reproducing extracts

For permission to reproduce content from BSI publications contact the BSI Copyright & Licensing team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email subscriptions@bsigroup.com.

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Useful Contacts

Customer Services
Tel: +44 345 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 345 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

bsi.