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Rules for Intruder Alarm Systems

Audible warning devices for external alarm

Requirements

VdS 2300en : 2001-07 (03)

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1 General

1.1 Scope

These rules contain minimum requirements for audible warning devices (WD) for use in intruder alarm systems in order to allow an external alarm to the anonymous public respectively for use as WD for external alarm in the protected premises.

These rules shall be applied in conjunction with the "Rules for intruder alarm systems, general requirements and test methods", VdS 2227 and the "Rules for intruder alarm systems, protection against environmental influences, requirements and test methods", VdS 2110. The "Rules for alarm systems, software controlled system components, requirements and test methods", VdS 2203, also apply for system components controlled by software.

The rules are also applicable for audible WD were functions are located partly or completely within a control and indicating equipment (CIE).

The test methods for audible WD are described in VdS 2329.

1.2 Validity

These rules are valid from 01. July 2001; they replace the edition VdS 2300 02/93 (02).

Note: This is a translation of the German rules; if there are any discrepancies, the German version shall be binding.

2 Normative references

These rules contain dated and undated references to other publications. The normative references are cited at the appropriate places in the clauses, the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to these rules only when announced by a change of these rules. For undated references the latest edition of the publication referred will be applied.

- **DIN 45 631** Procedure for calculating loudness level and loudness
- **DIN EN 60 529** Degrees of protection provided by enclosures (IP-Code) – corresponds with VDE 0470-1
- **DIN EN ISO 6988** Metallic and other non-organic coatings – sulphur dioxide – test with general condensation of moisture
- **DIN IEC 65A/179/CDV** Functional safety – Safety-relevant systems – Part 1: General requirements
- **E DIN EN 50131-4** Alarm systems – Intrusion systems – Part 4: Warning devices
- **EN 61 000-4-2** Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 2: Electrostatic discharge immunity test – Basic EMC publication
- **EN 61 000-4-3** Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 3: Radiated, radio-frequency, electromagnetic field immunity test

- **EN 61 000-4-4** Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 4: Electrical fast transient/burst immunity test
- **EN 61 000-4-5** Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 5: Surge immunity test
- **EN 61 000-4-6** Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 6: Immunity to conducted disturbances, induced by radio-frequency fields
- **IEC 60 068-2-1** Environmental testing – Part 2: Tests, Test A: Cold
- **IEC 60 068-2-2** Environmental testing – Part 2: Tests, Test B: Dry heat
- **IEC 60 068-2-3** Environmental testing – Part 2: Tests, Test Ca: Damp heat, steady state
- **IEC 60 068-2-6** Environmental testing – Part 2: Tests, Test Fc: Vibration (sinusoidal)
- **IEC 60 068-2-27** Environmental testing – Part 2: Tests, Test Ea: Shock
- **IEC 60 068-2-30** Environmental testing; Tests; Test Db and guidance: Damp heat, cyclic (12 + 12-hour cycle)
- **IEC 60 068-2-75** Environmental testing – Part 2: Test methods, Test Eh: Hammer test
- **VdS 2110** Rules for intruder alarm systems, protection against environmental influences, requirements and test methods
- **VdS 2195** Rules for intruder alarm systems, class A power supply units, requirements
- **VdS 2203** Rules for alarm systems, software controlled system components, requirements and test methods
- **VdS 2227** Rules for intruder alarm systems, general requirements and test methods
- **VdS 2329** Rules for Intruder Alarm Systems, Audible warning devices for external alarm, test methods

3 Terms and definitions

For general terms and definitions refer to the “Rules for intruder alarm systems, general requirements and test methods”, VdS 2227. In addition the following terms and definitions apply:

Alternative power supply: Battery which is able to supply an alarm system with energy for a specific period if the main power supply is not available.

Power supply unit type III (Primary battery or secondary battery not automatically rechargeable): Power supply not jeopardized by interruptions with limited capacity which cannot be recharged automatically.

4 Classification

The **performance criteria** for different classes are defined in the „Rules for intruder alarm systems, general requirements and test methods“, VdS 2227.

The **environmental classes** are set in accordance with the “Rules for intruder alarm systems, protection against environmental influences, requirements and test methods“, VdS 2110.

5 Protection against environmental influences

5.1 Limits of application

Environmental influences shall not affect the function of audible WD. Environmental influences can have various effects on operating characteristics, depending on the nature of the function applied. The manufacturer shall therefore specify the limits of application (e. g. climate).

5.2 Climates

The function of audible WD shall not be adversely affected by the thermic conditions described in table 5.01, appropriate to its environmental class.

Test	Functional test	Endurance test	Degree of severity, abbreviated description of conditions		
			II	III	IV
Dry heat (T1) as spec. in IEC 60 068-2-2	x		+55 °C, 16 h	+70 °C, 16 h	+70 °C, 16 h ¹⁾
Dry heat (T2) as spec. in IEC 60 068-2-2		x	No test	No test	+70 °C, 21 d ¹⁾
Cold (T3) as spec. in IEC 60 068-2-1	x		-10 °C, 16 h	-25 °C, 16 h	-25 °C, 16 h
Damp heat, steady (T4) as spec. in IEC 60 068-2-3	x		+40 °C, 4 d 93 % rel. humidity	No test	No test
Damp heat, steady (T5) as spec. in IEC 60 068-2-3		x	+40 °C, 21 d 93 % rel. humidity	+40 °C, 21 d 93 % rel. humidity	+40 °C, 21 d 93 % rel. humidity
Damp heat, cyclic (T6) as spec. in IEC 60 068-2-30	x		+40 °C, 2 cycles	+55 °C, 2 cycles	+55 °C, 2 cycles
Damp heat, cyclic (T7) as spec. in IEC 60 068-2-30		x	No test	+55 °C, 6 cycles	+55 °C, 6 cycles

¹⁾ The test at 70°C is made for showing the effect of heating by sun radiation.

Table 5.01: Climates

5.3 Protection against corrosion

Audible WD shall have adequate resistance to corrosion as specified in table 5.02.

Test	Functional test	Endurance test	Degree of severity, abbreviated description of conditions		
			II	III	IV
SO ₂ -corrosion (K3) as spec. in DIN EN ISO 6988		x	0.2 l SO ₂ , 5 cycles	2 l SO ₂ , 5 cycles	2 l SO ₂ , 20 cycles

Table 5.02: Protection against corrosion

5.4 Mechanical influences

The function of audible WD shall not be adversely affected by mechanical influences as described in table 5.03.

Test	Functional test	Endurance test	Degree of severity, abbreviated description of conditions		
			II	III	IV
Shock (M1) as spec. in IEC 60 068-2-27	x		A(ms ⁻²) = 1000 - (200 x M) 6 x 3 shocks, duration 6 ms each	A(ms ⁻²) = 1000 - (200 x M) 6 x 3 shocks, duration 6 ms each	A(ms ⁻²) = 1000 - (200 x M) 6 x 3 shocks, duration 6 ms each
Impact (M2) as spec. in IEC 60 068-2-63	x		0.5 J, 3 impacts per point	0.5 J, 3 impacts per point	1.0 J, 3 impacts per point
Vibration sinus (M3) as spec. in IEC 60 068-2-6	x		10-150 Hz, 2 ms ⁻² , 1 cycle/axes	10-150 Hz, 2 ms ⁻² , 1 cycle/axes	10-150 Hz, 2 ms ⁻² , 1 cycle/axes
Vibration sinus (M4) as spec. in IEC 60 068-2-6		x	10-150 Hz, 5 ms ⁻² , 20 cycles/axes	10-150 Hz, 5 ms ⁻² , 20 cycles/axes	10-150 Hz, 5 ms ⁻² , 20 cycles/axes

Table 5.03: Mechanical influences

5.5 Electromagnetic compatibility

The function of audible WD shall not be adversely affected by electromagnetic influences as specified in table 5.04.

Test	Functional test	Endurance test	Degree of severity, abbreviated description of conditions		
			II	III	IV
Electrostatic discharge of low energy (E1b) acc. to EN 61 000-4-2	x		Each 10-times pos. and neg. contact discharge 2, 4 and 6 kV and air discharge 2, 4 and 8 kV	Each 10-times pos. and neg. contact discharge 2, 4 and 6 kV and air discharge 2, 4 and 8 kV	Each 10-times pos. and neg. contact discharge 2, 4 and 6 kV and air discharge 2, 4 and 8 kV
Radiated, radio-frequency, electro-magnetic field (E2a) acc. to EN 61 000-4-3	x		80 – 2000 MHz, 10 V/m as well as 415-466 and 890-960 MHz, 30 V/m Modulation: AM 80 % (modulated with 1 kHz sinus) for at least 3 s and in addition 3-times switching on/off of the carrier with 1 Hz and 1 kHz	80 – 2000 MHz, 10 V/m as well as 415-466 and 890-960 MHz, 30 V/m Modulation: AM 80 % (modulated with 1 kHz sinus) for at least 3 s and in addition 3-times switching on/off of the carrier with 1 Hz and 1 kHz	80 – 2000 MHz, 10 V/m as well as 415-466 and 890-960 MHz, 30 V/m Modulation: AM 80 % (modulated with 1 kHz sinus) for at least 3 s and in addition 3-times switching on/off of the carrier with 1 Hz and 1 kHz
Conducted radio-frequency (E2b) acc. to EN 61 000-4-6	x		150 kHz-100 MHz, 140 dB μ V Modulation: AM 80 % (modulated with 1 kHz sinus) for at least 3 s and in addition 3-times switching on/off of the carrier with 1 Hz and 1 kHz	150 kHz-100 MHz, 140 dB μ V Modulation: AM 80 % (modulated with 1 kHz sinus) for at least 3 s and in addition 3-times switching on/off of the carrier with 1 Hz and 1 kHz	150 kHz-100 MHz, 140 dB μ V Modulation: AM 80 % (modulated with 1 kHz sinus) for at least 3 s and in addition 3-times switching on/off of the carrier with 1 Hz and 1 kHz
Conducted electrical fast transient – burst - (E3a) acc. to EN 61 000-4-4	x		Each for a period of 1 min pos. and neg. 0.25, 0.5 and 1 kV	Each for a period of 1 min pos. and neg. 0.25, 0.5 and 1 kV	Each for a period of 1 min pos. and neg. 0.25, 0.5 and 1 kV
Conducted surge with high energy (E4a) acc. to EN 61 000-4-5	x		5-times pos. and neg. cl. 3: line – line 0.5, 1 kV and line – ground 0.5, 1, 2 kV	5-times pos. and neg. cl. 3: line – line 0.5, 1 kV and line – ground 0.5, 1, 2 kV	5-times pos. and neg. cl. 3: line – line 0.5, 1 kV and line – ground 0.5, 1, 2 kV
Static magnetic fields (E6)	x		150 mT	150 mT	150 mT

Table 5.04: Electromagnetic compatibility

6 Functional reliability

6.1 Technical data

Technical data describing the audible WD shall be provided in German language. This data shall include all information and parameters necessary for the correct and reliable operation of the WD including the necessary information about the required power supply.

6.2 Installation instruction

Installation instructions written in the German language shall be provided for audible WD. These instructions shall include a clear illustration of the assembly and installation procedures and a reference of the applications for which the audible WD are suitable (including a statement of the class according to clause 4 as well as an indication for which sites the WD are suitable). In addition, information regarding adjustment (calibration) and maintenance is required.

Adjustments not allowed shall be indicated unambiguously.

6.3 Operating voltage behaviour

Nominal voltage, operating voltage range (at least nominal voltage $U_N \pm 15\%$) and maximum permitted ripple of the operating voltage shall be specified by the manufacturer. Audible WD shall be safe in their function within these specified values. Variations in the voltage as specified in table 6.01 shall not adversely affect audible WD.

Note: This requirement is not valid for WD powered by type III power supply units (see also VdS 2195).

Test	Functional test	Endurance test	Degree of severity, abbreviated description of conditions		
			II	III	IV
Operating voltage range system-voltage (B1b)	x		$U_N \pm 15\%$ or system dependent	$U_N \pm 15\%$ or system dependent	$U_N \pm 15\%$ or system dependent
Operating voltage surge system voltage (B2b)	x		10 cycles from $U_N + 15\%$ to $U_N - 15\%$ and back or system dependent	10 cycles from $U_N + 15\%$ to $U_N - 15\%$ and back or system dependent	10 cycles from $U_N + 15\%$ to $U_N - 15\%$ and back or system dependent

Table 6.01: Changes of operating voltage

6.4 Ripple of the operating voltage

As a minimum requirement audible WD shall function safely with a voltage ripple of $\leq 1.0 V_{SS}$ if a nominal voltage of 12 V is specified. For 24 V nominal voltage the ripple value is $\leq 2.0 V_{SS}$. For other nominal voltages the specifications of the manufacturer are definitive.

Note: This requirement is not valid for WD powered by type III power supply units (see also VdS 2195).

6.5 Reliability

The selection of components for audible WD shall be such that they are suitable for the selected environmental class.

6.6 Components

Only components using technology which has proved its reliability in various applications over a period of two years may be used. For components of unproved reliability other means of proof may be considered for evaluation on an individual basis.

All components shall be continuously operated within the limits specified by the manufacturer while taking into consideration the ambient temperature (including inherent warming) (see also DIN IEC 65A/179/CDV).

6.7 Relays

Relays shall be protected against the effects of dust at least to the degree of protection specified by DIN EN 60 529 (identical with VDE 0470-1).

Relay contacts shall be designed for at least 10,000 switching cycles at a corresponding connected load.

6.8 Switches

Switches shall be fitted with self-cleaning contacts or be enclosed in dust-protected casings complying at least with the degree of protection specified by DIN EN 60 529 (identical with VDE 0470-1) - IP 5x.

6.9 Access to assemblies and components

If audible WD contain changeable parts they shall be constructed to ensure easy access to assemblies and components as well as their replacement. Provisions shall be made to reduce handling errors to a minimum.

6.10 Connecting and adjustment elements

Connecting and adjustment elements shall be marked and shall be easily accessible to the installer and the maintenance service personnel, however not for the user of the system – except the connecting elements for equi-potential bonding and surge protection measures.

Connection elements for connection to the IAS cabling shall be designed in a way that ensures safe operation and protection against corrosion.

7 Operational security

7.1 Degree of protection

Audible WD shall, if installed, be constructed at least to the degree of protection as specified by EN 60 529 (identical with VDE 0470-1) - IP 3x.

7.2 Protection against access

Parts affecting the function of audible WD as well as connecting elements and adjustment elements shall not be freely accessible; they shall be protected e. g. by covers. Excluded from these requirements are connecting elements for equipotential bonding and surge protection measures.

8 Tamper

8.1 Tamper protection

8.1.1 Stable housing, covers

Audible WD shall be equipped with an adequate mechanically stable protective housing (for WD to the application outside the protected premises at least 1.5 mm steel or equivalent). Covers shall be fastened mechanically stable to the housings, e. g. by screwing.

8.1.2 Fastening of covers

Covers shall be fixed such that a fast access is not possible (e. g. by screws with long thread).

8.1.3 Mounting on the mounting surface

It shall be possible to fix audible WD such that a fast removal from the mounting surface is not possible.

8.1.4 Sight Protection

It shall not be possible to see into the housing of the installed WD.

8.1.5 Wire insertion

Wires shall be inserted in the WD such that an attack is not possible once the WD is installed. Excluded from the requirement are the connecting elements for equipotential bonding and surge protection measures.

8.2 Tamper detection

Opening of audible WD shall be detected and signalled. The inside of the audible WD and the monitoring of the opening shall be protected against access until the monitoring system has responded.

Only micro-“snap“-switches complying with DIN 41 636 or equivalent parts shall be used for cover contacts. They shall comply at least with the degree of protection specified by DIN EN 60 529 (identical with VDE 0470-1) - IP 4x.

The contact area of the contacts shall be gold-plated or of equivalent finish. Alternatively, reed contacts may be used as long as they cannot be influenced from the outside.

The minimum response time (holding time) of the opening monitoring system shall be specified by the manufacturer if the device has an interface complying with clause 11.

9 Construction

9.1 Stability

Audible WD shall be of adequate mechanical strength.

9.2 Stationary installation

Audible WD shall be designed to facilitate static installation.

9.3 Freedom of potential, isolation resistance

The casing and all parts of the casing of audible WD shall be free from electrical potential (with the exception of electrical protective measures). The isolation resistance shall be at least 500 kΩ.

9.4 Equi-potential measures

It shall be possible to connect visual WD which are specified for the use outside of the protected premises to the equi-potential bonding. For this purpose a possibility to clamp wires with a sectional view of 4 mm² to 16 mm² is to be provided (only if metal housings are used).

9.5 Strain relief

Connecting and terminal points of cables and leads shall be relieved of mechanical stress where such stresses can be anticipated.

9.6 Connection elements

Connection elements of audible WD for connection to the IAS cabling shall be designed in a way that ensures safe operation and protection against corrosion.

9.7 Fastening

Audible WD shall be constructed to allow proper installation, also under harder conditions (e. g. installation when standing on a ladder) and connection to the wiring of the IAS.

10 Function

10.1 Alternative power supply

Depending of the use the WD shall also function when powered by the operational voltage of the alternative power supply of the connected intruder alarm system.

10.2 Volume

The volume of audible WD shall be when installed at least 100 dB(A) – measured according to DIN 45 631 – in the complete operating voltage range and in an angle of 180° in 1 m distance.

10.3 Frequency of the signal

Audible WD shall operate in a frequency-range of 400 Hz – 1800 Hz with an increasing sawtooth function. The time of increase of the sawtooth function shall be in an interval of 1 – 3 s. Harmonics (outside of the a.m. frequency range) may reach at a maximum 70 % of the voltage value of the fundamental wave.

10.4 Limitation of operation

The operation time of audible WD shall be limited automatically. The time limitation shall be adjustable for the installer within the limits of 20 s to 180 s.

Remark: This limitation is normally part of the intruder control and indication equipment (CIE).

11 Interface to the Intruder/ Hold-Up Alarm System

Interfaces to other parts of the system, e. g. to the intruder alarm control and indicating equipment (CIE), shall be designed to ensure proper functioning. A combined test may be necessary depending on the design of the visual WD and the other parts of the system.

11.1 Inputs for conventional line termination technology

For IAS with a “conventional” line termination technology (end-of-line resistor) the following requirements are valid for the inputs of audible WD.

- Connection possibility for the power supply voltage and control circuit (if necessary)

Class B and C:

- Additional connection possibility for an element for monitoring (e. g. end-of-line resistor)

11.2 Other interfaces

The performance shall be specified by the manufacturer.

12 Power supply

The necessary power supply for audible WD shall at least meet the requirements of the equivalent class of the IAS. For type III power supply units (see also VdS 2195) proof of a installation possibility shall be given.

13 Options

Options shall have no adverse effect on the functions required for audible WD. The performances of the options shall be specified by the manufacturer.

Changes

Compared with edition VdS 2300 02/93 (02) the following changes have been made:

- Addition of clause 2 (new) "Normative references"
- Amendment of clause 3 „Terms and definitions“ by the definition „Alternative power supply“
- Amendments for the use of power supply units
- Revision of complete clause 5 "Protection against environmental influences"
- Amendment of clause 6.5 „Ripple of the operating voltage“
- Revision of clauses 6.5 and 6.6
- Revision of clause 8.1
- Indication, that cables/wires for the equi-potential bonding and surge protection measures are not security-relevant
- Assignment of requirements of clause 10.3 to the spectrum of signals on the basis of E DIN EN 50131-4
- Editorial changes