Self-test Devices for Components of Fire Detection and Alarm Technology

Requirements and Test Methods

These draft guidelines have been agreed with the expert audience and can now be used as a basis for tests/inspections and certifications. Until the final publication of the guidelines, changes may be expected.

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VdS Guidelines for Fire Detection and Fire Alarm Systems

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Requirements and Test Methods

These draft guidelines have been agreed with the expert audience and can now be used as a basis for tests and certifications. Until the final publication of the guidelines, changes may be expected.

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1 General

1.1 Scope

These guidelines specify requirements, performance characteristics and test methods for self-test devices which are used especially in fire detection and alarm systems. Self-test devices may be integrated in components of a fire detection and alarm system or may be realised by additional devices.

Note: The present guidelines may be used among others also for self-test devices of hold-open systems.

Self-test devices may fulfil different test objectives and may use active or passive mechanisms.

The procedure for testing, approval and certification according to these guidelines is based on the specifications of VdS 2344en. The General Terms and Conditions for the provision of services of the department Products and Companies, VdS 3177en in the version valid at the time the contract is concluded shall apply.

1.2 Validity

These guidelines are valid from 01.04.2021.

Note: This is a translation of the German guidelines. If there are any discrepancies, the German version shall be binding.

1.3 Application notes

Testing and approval in accordance with these guidelines may be performed only in combination with a product/system approval as per valid guidelines and standards.

In addition, it shall be guaranteed in case of an approval of a self-test device according to these guidelines, that the originally approved product or system characteristics are not negatively influenced (this is applicable for the individual component as well as for the overall system). The test scope is determined by the certification body, e.g. on base of the applicants` concept.

Conflicts with national rules of application are not assessed within the framework of these guidelines. The responsibility for this assessment lies with the applicant.

The approval according to these guidelines only reflects the fulfilment of requirements for test objectives from the application rules, which are included in the application rules, at the time of approval.

If requirements for test objectives in the application rules are changed or added later, compliance with these requirements must be re-evaluated.

2 Normative References

These guidelines contain dated and undated references to other regulations (in alphabetical order). The normative references are cited in the respective clauses, the titles are listed below. For dated references, subsequent amendments to or revisions of any of these regulations apply to these guidelines only when published by revision or amend-

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ment of these guidelines. For undated references the latest edition of the regulation referred to applies.

Note: Either the titles of the cited publications are translations (in italics) or the original English titles – as far as given – are cited. If there are any discrepancies, the German version shall be binding.

EN 54-1 Fire detection and fire alarm systems – Part 1: Introduction

EN 50130-4 : 2011 + A1:2014 Alarm systems – Part 4: Electromagnetic compatibility

EN 50130-5 : 2011 Alarm systems – Part 5: Environmental test methods

DIN VDE 0833-1 Alarm systems for fire, intrusion and hold-up – Part 1: General requirements

VdS 2203en VdS Guidelines for Fire Prevention and Security, Software, Requirements and Test Methods

VdS 2543 Richtlinien für Brandmeldeanlagen – Allgemeine Anforderungen (*Guidelines for Fire Alarm and Detection Systems – General Requirements*)

VdS 3177en General Terms and Conditions for the provision of services of the department Products and Companies

VdS 2344en Procedure for the testing, approval, certification and conformity assessment of products and systems for fire protection and security technologies

3 Terms, definitions and abbreviations

3.1 Terms and definitions

Self-test device: is testing autonomously if performance characteristics or external conditions of a component or a system (e.g. fire detection and alarm system) may be affected; the self-test device may be integrated in a component of the FDAS and supported by hard- and/or software.

Performance characteristics: functions or properties required by standards or VdS guidelines

Test objective: Performance characteristic or external condition, which is tested by the self-test device

Component: Device contained in one housing, that performs a function, several functions or part of a function of a fire detection and fire alarm system (definition as in EN 54-1)

Additional device of the self-test device: Equipment which performs at least one or part of a function of the self-test device and which is spatially separated from the component.

Non-retroactivity: is given, if external functions and devices are connected to a safety system non-retroactively, if a failure and/or a malfunction of these functions/devices or the lines to these devices have no influence on the safety system itself (e.g. no influence on functions, networks, firmware, power supply) and the undisturbed operation of the safety system is ensured at any time independent of these functions/devices.

Note on the term: This does not affect the possibility of evaluating and processing a fault condition of these functions/devices.

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3.2 Abbreviations

FDAS Fire detection and fire alarm system

4 Test objectives

A self-test device may fulfil one or several of the test objectives mentioned in Annex A partly or completely.

Depending on the chosen test objective to be reached the respective requirements shall be fulfilled. The examination of the complete documentation by VdS is part of the approval process.

The tables in Annex A show an overview of the test objectives.

VdS reserves the right to adopt the product specific requirements and test methods in the guidelines after three years.

5 Requirements

5.1 General requirements

In order to comply with these guidelines self-test devices shall meet the requirements of this clause, which is to be tested in accordance with clause 6 with regard to effectiveness, reliability and recording of a performed self-test.

5.2 Technical documentation

The applicant shall present a technical documentation (e.g. user documentation) which unambiguously and unmistakably describes the correct use of the self-test device. All operational parameters (e.g. supply voltage range, power consumption etc.) shall be specified in detail.

The self-test device and its effects on operation, maintenance and servicing of a system shall be documented in a manner accessible to concerned parties (installer, operator, maintenance service etc.)

5.3 Marking

In case additional devices of the self-test device are not covered by the standards series EN 54, the following information shall be identifiable:

– name or trademark of the manufacturer
– model designation
– marking of code with which the manufacturer may identify at least the date of manufacture or production batch and the site of manufacture
– version number of the used software
– designation of connection terminals

The marking shall be visible at least during installation and accessible during the maintenance. Markings shall be durable and shall not be affixed on screws or other easily removable parts.

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5.4 Concept

The applicant shall prepare a test-objective oriented concept description. This shall specify which test objectives are to be tested with the self-test device to be evaluated.

In addition, the influence of the self-test device on application rules as well as possible modifications, e.g. with regard to the maintenance measures required by the standards, shall be described.

This description shall include:

- the test objective(-s)
- the requirements of the application rules which are to be fulfilled with the self-test device (e.g. DIN VDE 0833-1, maintenance measures) – if applicable
- how the self-test device reaches the test objectives
- the functionality of the self-test device; this description shall at least contain the following items:
  - activation/deactivation of the self-test device
  - effects of results of the self-test (e.g. forwarding, technical and organisational measures)
  - securing non-retroactivity
  - effects of the self-test device on the effectiveness of the system
  - realised displays (operation display of the self-test, faults of the self-test device or similar)

5.5 Self-test device

If the application rules contain requirements the self-test device must be based on these.

If self-test devices are integrated parts of FDAS components, these components with integrated self-test device shall fulfil the requirements of the respective part of the standard series EN 54.

If additional devices of the self-test device are used and these are not included in the scope of the EN 54, they shall fulfil the following requirements:

a) Compliance of functionality (display, control, activation) with the applicant's specifications: this functionality shall be consistent with the purpose of the FDAS. The applicant shall provide means for testing the functionality

b) Compliance with the requirements of EN 50130-4, Electromagnetic compatibility

c) Compliance with the requirements of EN 50130-5; the applicant shall declare the environmental class. The functional tests are performed before, during (if necessary) and after the environmental exposure. There shall be no change in the function of the additional device of the self-test device and no significant changes in any measurements, which shall also remain within specification

d) Compliance with the requirements of VdS 2543

e) Compliance with the guidelines VdS 2203 (for software controlled self-test devices)

Note: Alternatively to b) and c), additional components of the self-test device may comply with the environmental classes included in the relevant part of the EN 54 standard series (see Environmental tests in EN 54-1:2011, section 5, for the selection of the appropriate part).

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6 Tests

6.1 General

The self-test device is tested in a two-stage procedure. First, the concept of the applicant is evaluated, then the concept is validated in the form of tests of the self-test device.

6.2 Test of the technical documentation

By visual inspection of the technical documentation it is verified, if the specimen corresponds to the technical documentation and if the documents are complete and contain the required information as specified in clause 5.2.

6.3 Test of the marking

By visual inspection, it is ascertained if the marking fulfils the requirements according to clause 5.3. The durability and legibility of the marking are evaluated following the environmental tests.

6.4 Test of the concept

The concept of the applicant is examined with regard to the contents required in accordance with clause 5.4, as well as the justification, plausibility and comprehensibility. This includes an assessment of whether the self-test device is qualitatively and quantitatively suitable to achieve the declared test objective and whether the functionality is in line with the purpose of the FDAS.

6.5 Test of the self-test device

The self-test device is checked for compliance with the requirements according to clause 5.5. After a successful test of the concept, a test plan specific to the respective implementation is defined for the validation of the concept. For this purpose, the evaluation criteria (pass/fail) and the type and extent of the required test(-s) are specified on the basis of the concept to prove that the declared test objective is achieved.

If self-test devices are integrated parts of FDAS components, these parts with an integrated self-test device shall be tested on base of the test methods of the respective part of the standard series EN 54.

If additional devices of the self-test device are used and these are not included in the regulation scope of EN 54, the following test methods shall be applied:

a) The functionality verification means provided by the applicant is used to check that the functionality (display, control, activation) complies with the manufacturer's specifications

b) Test methods according to EN 50130-4

c) Test methods according to EN 50130-5

d) Test methods according to VdS 2543

e) Test methods according to VdS 2203

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Annex A Test objectives

The following tables give an overview of possible test objectives.

For evaluation of the self-test device, the applicant shall determine concrete, measurable criteria, which are oriented towards the individual implementation.

Note: E.g. the "size of an object" is described in a sufficiently measurable way by definition, whereas the "correct function" is not described in a sufficiently measurable way.

A.1 Test objectives for smoke detectors

Test objective	Description	Criteria
Monitoring of optical signal path	Identification of influences of the detection characteristics	
Monitoring of smoke ingress	Identification of influences at the boundary of the housing which have negative influences on the intended smoke ingress	
Monitoring of the environment	Detection of external objects of a size defined by the applicant in a monitoring area specified by the applicant**,** in accordance with the minimum requirements of the application rules, which can negatively influence the intended smoke ingress	

A.2 Test objectives for systems

Test objective	Description	Criteria
Test of the transmission path	Test of availability, function and compliance with the operating parameters	
Quality assessment of the transmission path	Testing for correct and undisturbed information transmission and evaluation of possible packet losses on the transmission path	

A.3 Test objectives for alarm devices

Test objective	Description	Criteria
Acoustic function test	Test of correct function of the sound generator with real alarm signal	
	Test of correct function of the sound generator without acoustic exposure of the environment	
Optical function test	Test of the correct function of the optical equipment	
	Test of the correct function of the optical equipment without visual exposure of the environment	

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