



Procedure for the approval of new extinguishing techniques

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VdS-Guidelines for extinguishing systems

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CONTENT

Declaration of non-binding status	4
1. Preface	4
2. Scope	5
3. Definitions	5
4. Normative references	5
5 Order	5
6. Procedure	6
6.1 Acceptance of the order.....	6
6.2 Fundamental agreements.....	7
6.3. Fire and extinguishing tests	8
6.4. Component and system tests	9
6.5. Certification	9
Annex 1 Example deluge fire extinguishing systems	10
Annex 2 Examples for the instruction for planning and installation of the extinguishing system(s)	12
Annex 3 Technical documentation	14
Annex 4 Planning of the fire and extinguishing tests	15
Annex 5 Documentation at start of procedure (example fine water spray system).	16

Declaration of non-binding status

These VdS-Guidelines for procedure for the approval of new extinguishing techniques are binding only if their application has been agreed on an individual basis.

1. Preface

The activities of VdS Schadenverhütung (VdS) in the field of fire protection are aimed at the effectiveness and reliability of installed fire protection systems. Approval inspections and regular revision inspections of installed fire protection systems are carried out to confirm their effectiveness and reliability.

The VdS concept for effective and reliable fire protection systems is shown in Figure 1. It is based on decades of experience and applicable to a variety of system technologies (e.g. sprinkler systems, gas extinguishing systems, fire detection and fire alarm systems).

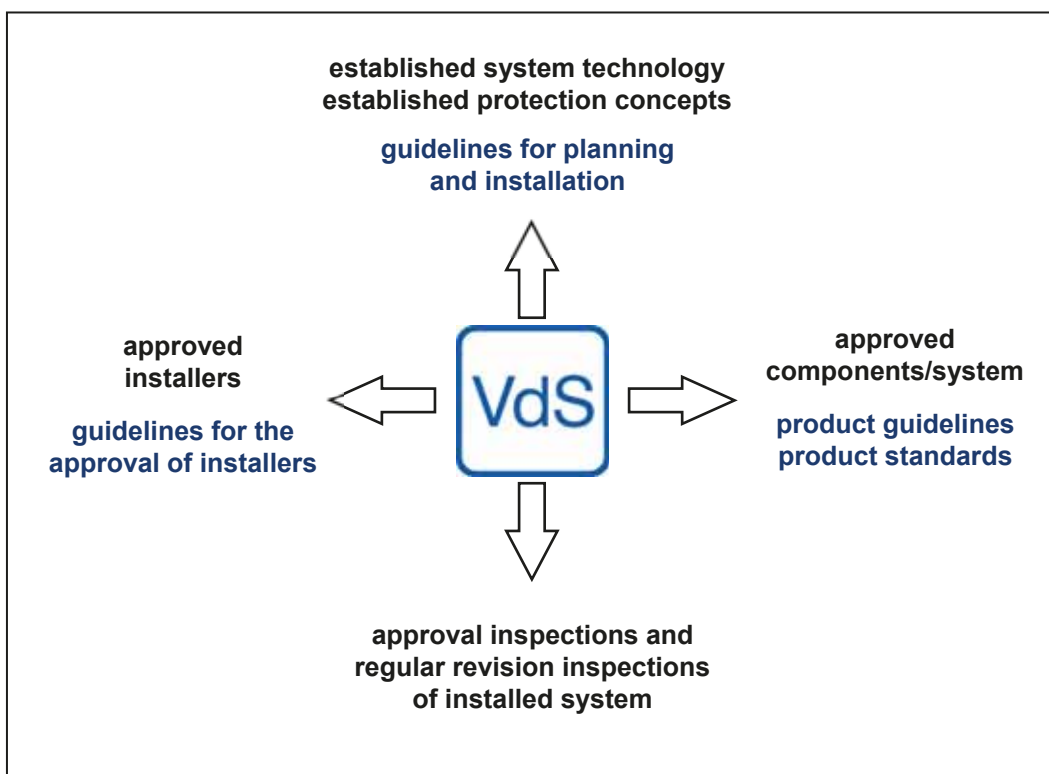


Figure 1: VdS concept for effective and reliable fire protection systems

The effectiveness and reliability of an installed fire protection system can be attested by VdS in the course of an approval inspection, provided that

- guidelines for planning and installation of the system technology (e.g. sprinkler systems, gas extinguishing systems) are available, and
- these guidelines for planning and installation contain the applied protection concept, and
- the system has been installed in accordance with these guidelines for planning and installation by an installer approved for this system technology using products (components, systems) approved for this system technology.

The VdS concept is applicable to a certain fire protection system without any further measures, if all modules of the VdS concept (Figure 1) are available for the system technology and the applied protection concept.

However, this is not always the case, especially with new protection concepts or new system technologies.

In these cases the missing modules of the VdS concept need to be replaced by approvals for the new protection concept or the new system technology. In the procedures for these approvals the extinguishing effectiveness and the reliability shall always be evidenced.

2. Scope

These guidelines specify a procedure for the approval of new extinguishing techniques.

For the client this procedure gives:

- a transparent and documented process
- a VdS test report about the tests carried out with his system
- in case of a positive completion a VdS certificate, which confirms the conformity of the system with the instructions agreed upon as well as its suitability as an extinguishing system for an individual case or a range of application

In addition, requirements regarding installation, maintenance and the field inspection of installed extinguishing systems by VdS are normally agreed as part of the procedure. VdS reserves the right to refuse an order if the client refuses to agree to such requirements.

These guidelines are not applicable to new protection concepts for extinguishing technologies for which VdS-Guidelines for planning and installation already exist. Such new protection concepts are covered by the guidelines VdS 3114 - Procedure for the Approval of New Protection Concepts.

3. Definitions

New extinguishing technology: system technology for which VdS-Guidelines for planning and installation do not yet exist.

Protection concept: comprehensive instructions for the planning and installation of an extinguishing system for a certain risk (application or individual case).

New protection concept: a protection concept not specified in the VdS-Guidelines for planning and installation.

Blocking period: period of time agreed between client and VdS, after which VdS may use documents of the approval procedure (e.g. descriptions of the new extinguishing technology, specifications of the risks and the protection concepts, test reports, etc.) in the development of VdS-Guidelines.

4. Normative references

These guidelines incorporate references to other publications. For undated references the latest edition of the publication referred to applies.

VdS 2344 Procedures for testing, approval and evaluation of conformity of equipment, components and systems of fire protection and security technologies

5 Order

Note: Prior to the procedure a meeting should take place to clarify whether and, if so, in what way these guidelines are applicable under the specific circumstances. The client presents his extinguishing technique, its scope of application and the protection concepts and VdS informs the client on the basics of the procedure specified in these guidelines. In particular, in this meeting it should also be clarified whether and, if so, in what way a blocking period (see definitions) is to be agreed.

The procedure is considered as ordered, if an order has been submitted to VdS in accordance with VdS 2344, annex D, for the testing and approval of the extinguishing technique (components and system as applicable).

The order for the testing and approval shall be accompanied by the following documents:

- An instruction for planning and installation of the extinguishing system(s) (planning and installation manual). As far as possible, the client should orientate himself on existing VdS-Guidelines and refer to them. Comments on the planning and installation manual of the extinguishing system(s) are given in annex 2.
- Possibly required permissions of other authorities, as e.g. approval for extinguishing agent, measures for personal protection (e.g. Employers' Liability Insurance Association (BG)).
- A description of the system and the respective components, their co-operation and limits for their use (see also comments in annex 3).
- A list of the components with the respective documentation to be left at VdS (see also comments in annex 3).
- Requirements regarding installation, maintenance and VdS field inspection of installed extinguishing systems, amongst others:
 - Requirements for the installer of the extinguishing system
 - Minimum intervals and extent of the maintenance by a competent contractor
 - Requirements for the competent contractor for maintenance
 - Instructions concerning the field inspection of installed extinguishing systems by VdS (moment of the delivery of planning and installation documents)
 - Minimum intervals for re-inspections of the extinguishing system by VdS

An example of documents for an order for approval of a fine water spray system is given in annex 5.

6. Procedure

The procedure is carried out in the following steps:

- a) Acceptance of the order..... (see 6.1)
- b) Fundamental agreements..... (see 6.2)
 - Agreement of rules for planning and installation of the extinguishing system(s)
 - Agreement concerning fire and extinguishing tests
 - Agreement concerning component and system tests
 - Agreement concerning the use of the test results by VdS
- c) Planning and execution of fire and extinguishing tests (see 6.3)
- d) Execution of function and safety relevant component tests (see 6.4)
- e) Certification (temporary) (see 6.5)
- f) Execution of component tests relevant for reliability (see 6.4)
- g) Certification (see 6.5)

The individual steps of this procedure are explained in detail in the following.

6.1 Acceptance of the order

The receipt of the order is confirmed by VdS in writing.

Within a preliminary test, the documents placed at disposal by the client are tested concerning completeness and sufficient content of information. Approvals of authorities which may be necessary, e.g. approval for the extinguishing agent or regulations

concerning personal protection, shall be available at that time. The client will be informed in writing about the result of the preliminary test.

6.2 Fundamental agreements

The agreements of clause 6.2.1 to 6.2.4 shall give a common basis for the whole further procedure. In the interests of the client, already at the beginning of the procedure and before expensive fire tests, the subsequent measures and effects are agreed.

6.2.1 Agreement of rules for planning and installation of the extinguishing system(s)

The instruction for planning and installation of the extinguishing system(s), placed at disposal by the client, will be examined concerning sufficient regulations. Explanations for this are given in appendix 2.

As part of the examination, the safety philosophy incorporated in the protection concepts (safety factors, redundancies, availability) is evaluated. Required is at least equivalence to the safety philosophy which is incorporated in the protection concepts specified in the VdS-Guidelines for planning and installation of other system technologies.

The client will be informed about the result of the examination in writing.

If VdS requires modifications or amendments of the specification of the protection concept, appropriate agreements will be made between the client and VdS. Generally, at this stage any such values are not yet taken into account, which are relevant for the extinguishing effectiveness and which can be fixed only after carrying out the fire and extinguishing tests (e.g. figures for design density or required extinguishing gas concentration). However, safety factors for the normal design of extinguishing systems compared to the design in fire and extinguishing tests should be fixed at this stage already.

If the procedure shall include the agreement of regulations for installation, maintenance and VdS inspection of installed extinguishing systems, the examination refers to these items, too.

6.2.2 Agreement concerning fire and extinguishing tests

If, from the point of view of VdS, fire and extinguishing tests are necessary for the proof of the extinguishing efficiency, the procedure can only be continued if the client agrees to perform fire and extinguishing tests according to the procedure described in clause 6.3.

6.2.3 Agreement concerning component and system tests

If, from the point of view of VdS, component and system tests are necessary for the proof of the system reliability, the procedure can only be continued if the client agrees on the performance of component and system tests according to the procedure described in clause 6.4.

If no other agreements are made, the component and system tests will be carried out according to the procedure for the approval and testing of fire protection and security equipment, components and systems, VdS 2344.

If the component testing is aspired to be done in two steps, it has to be agreed that failures, which are found later during the component and system test in the VdS laboratories, will be repaired on site respectively that components will be exchanged – if necessary – free of charge.

6.2.4 Agreement concerning the use of the test results by the VdS

The procedure can only be continued, if an agreement is reached whether – and in case how – VdS may use documents of the approval procedure (e.g. descriptions of the new extinguishing technology, specifications of the risks and the protection concepts, test reports, etc.) in the development of VdS guidelines, if applicable with blocking time.

6.3. Fire and extinguishing tests

6.3.1 General

Evidence of the extinguishing effectiveness is generally given by means of practice-related fire and extinguishing tests. The significance of a positive test result is checked by at least one repeat test. The number of necessary repeat tests is agreed in advance. The results of all repeat tests shall be positive.

6.3.2 Planning of the fire and extinguishing tests

The fire and extinguishing tests are agreed with the client. They shall

- take into account the normal operating conditions of the extinguishing system(s);
- take into account any operating conditions unfavourable for the extinguishing system(s); and
- verify a safety factor to the normal design of the extinguishing system(s).

These requirements may make necessary several tests under different operating conditions.

Annex 4 gives a survey of the issues to be taken into account in the agreement.

6.3.3 Preparation of the fire and extinguishing tests

The fire and extinguishing tests shall be carried out in a fire test room appropriate for these tests. Among others, the following aspects shall be taken into account when choosing the fire test room or the test facility respectively:

- size of the fire test room – in relation to the fire scenario and the expected smoke gas quantity;
- ventilation – as regards possibilities for supply air and exhaust air before and during the fire and extinguishing test;
- availability of or possibility to install the necessary fire detection and fire alarm technology and extinguishing technology in the fire test room;
- availability of or possibility to install the required system capacity (e.g. pump capacity) and/or extinguishant quantity (e.g. extinguishing water supply);
- possibilities of retention and disposal of extinguishing water for the tests to be carried out.

VdS decides whether the fire test room is appropriate for the tests.

The fire and extinguishing tests shall be organised and carried out by an appropriately qualified body. This body submits a comprehensive documentation of the test setup.

The measurements are generally carried out by VdS. By agreement with VdS, the measurements (or subtasks) may be carried out by another body appropriately qualified and equipped (e.g. an independent laboratory accredited in accordance with DIN EN ISO/IEC 17025). This body submits a comprehensive documentation of the measuring technology including calibration verifications.

The documentation of the test setup is checked by VdS for compliance with the agreements made.

In order to ensure that the test results will be and remain valid, already before the tests the client provides evidence that the components to be used in the tests fulfil possible existing formal criteria. Furthermore he orders the VdS laboratories to check and determine those characteristics of the components, which are necessary to know for the validity of the tests.

6.3.4 Execution of the fire and extinguishing tests

The fire and extinguishing tests including repeat test(s) are carried out by order of the client and are witnessed generally by two VdS Engineers.

After the repeat test(s), all components whose modifications would imply new fire tests are removed from the test setup and handed over to VdS.

6.3.5 Documentation of the fire and extinguishing tests

The fire and extinguishing tests are generally documented by VdS. If the measurements are carried out and the documentation is done by another independent body accepted by VdS, the test report shall include the documentation of all fire and extinguishing tests and comply with DIN EN ISO/IEC 17025. The test report shall be submitted to VdS.

6.3.6 Evaluation of the fire and extinguishing tests

If the fire and extinguishing tests evidence the criteria agreed for a positive evaluation, the client – by agreement with VdS – takes into account those design parameters of the extinguishing technique which depend on the result of the tests in his planning and installation manual.

6.4. Component and system tests

The test schedule for the component and system tests (in the following called product test) is agreed upon on the basis of a proposal of VdS. The product test may be divided into two steps:

Step 1:

- Testing of the documentation of the products including probably necessary regulatory approvals
- Testing of the compliance of the products with the documentation
- Tests for the proof of function and safety of the products (e.g. pressure resistance test, function test at normal temperature)

Step 2:

- Tests for the proof of the reliability of the products (long-term tests, environmental tests, wear resistance tests)

6.5. Certification

On the basis of a positive evaluation of the fire and extinguishing tests, the presentation of the instruction for planning and installation of the extinguishing system(s) agreed upon and the positive result of the product test (step 1), a preliminary certificate according to the aim of the order with a description of the protection aim as well as maybe a reference to the restricted protection value of the extinguishing system (example: extinguishment of oil fire in a magnesium production) may be issued.

The product test (step 2) will be carried out within 2 years after the issue of the certificate.

On the basis of the positive results of the product test (step 2) the preliminary certificate can be confirmed. In case of a negative result of the product test (step 2) the certificate will be withdrawn, if the client does not eliminate the determined failures. In case of products already installed, the procedure according to clause 6.2.3 shall be followed.

Annex 1 Example deluge fire extinguishing systems

Every extinguishing system has to fulfil the following general requirements:

- The extinguishing system shall be designed to extinguish effectively
⇒ extinguishing efficiency
- The extinguishing system shall operate reliably over a long period of time
⇒ system reliability

In general, the VdS-Guidelines represent a comprehensive basis for the performance of these general requirements:

- VdS-Guidelines for products (components and systems)
- VdS-Guidelines for planning and installation of fire extinguishing systems
- VdS-Guidelines for the approval of installers

Special importance have the VdS-Guidelines for planning and installation, since the requirements from other guidelines derive from them. Using the example of VdS-Guidelines for planning and installation of deluge fire extinguishing systems, VdS 2109, the following table shows some items important for the planning and installation of fire extinguishing systems and the respective determinations fixed in VdS 2109.

Items important for planning and installation	Determinations in VdS 2109
Installation by a VdS approved installer	required
Announcement of installation to the 'Technische Prüfstelle' (field inspection department) of VdS	required
Testing of the planning documents by the 'Technische Prüfstelle' of VdS	required in individual cases
Notification of installation to the 'Technische Prüfstelle' of VdS	required
Field inspection by the 'Technische Prüfstelle' of VdS (test of conformity with all determinations of the VdS guidelines for planning and installation, functional test)	required
Use of VdS approved components	required, components specified
Components which do not have to be approved	components specified, e.g. pressure gauge acc. to DIN, motors
Technical and functional design of the extinguishing system depending on the case of hazard	determined, e.g. kind and number of water supplies
Design of the extinguishing system with regard to the extinguishing efficiency	determined, e.g. required design density, time of operation, area of operation
Kind and installation of the extinguishing nozzles	kind and installation of nozzles determined
Design of the pipe work	calculation required

Items important for planning and installation	Determinations in VdS 2109
Energy supplies	required
Required alarm	e.g. alarm transmission determined
Required periphery	e.g. requirements for buildings determined
Fire detection, triggering, controlling and release of the extinguishing system	determinations included
Monitoring of the extinguishing system	determinations included
Maintenance, servicing by a VdS approved contractor	required
Re-inspections by the 'Technische Prüfstelle' of VdS	required

Annex 2 Examples for the instruction for planning and installation of the extinguishing system(s)

The aim of the instruction is the provision of every information important for the planning and installation of the extinguishing system

It shall include clear information about the following questions:

- Which risks may be protected?
- Where/what are the application limits of the extinguishing system?
- Which protection aim is reached in these risks?
- How is this protection aim reached?
- How shall the extinguishing system be designed and installed within the protection area?
- How shall the other parts of the extinguishing system be designed and installed?
- Which measures for personal protection are necessary?

The following tables exemplarily give key words and references to the required information.

Which risks can be protected?

Where/what are the application limits of the extinguishing system?

Key words	Documents
Geometry of the protection area - Length - Width - Height - Area - Volume Fire load in the protection area Use of the protection area	for an individual case: - Drawings of the risk - Furnishing, facilities (fire load) for a range of application: - Characteristic description of the risks to be protected including a list of all parameters with information about the maximum and minimum values - Description of the fire load with information about the maximum and minimum values

Which protection aim is reached in this risk?

Key words	Documents
Room protection Protection of individual objects Fire events	Description of the protection aim which is aspired

How is the protection aim reached?

Key words	Documents
Design density Range of action Time of operation Discharge and reserve quantities Soaking time	Description of the necessary design of the extinguishing system to ensure that the protection aim is reached

How shall the extinguishing system be designed and installed within the protected area?

Key words	Documents
Pipe arrangement Nozzle arrangement Protection cap Corrosion protection	for an individual case: – Drawings of the extinguishing system for a range of application: – Characteristic planning of extinguishing systems including a list of all parameters, which are relevant for the planning with information about maximum and minimum values (refer to information of risk)

How shall the other parts of the extinguishing system be designed and installed?

Key words	Documents
Fire detection Pipework design Supply of extinguishing agent Alarm Required periphery Monitoring Components Corrosion Danger of contamination	Not required if there are VdS-Guidelines for planning and installation for the extinguishing system; in this case it may be referred to these guidelines in general. If there are no VdS-Guidelines for planning and installation of the extinguishing system, instructions analogue to the VdS-Guidelines for planning and installation of other extinguishing systems are necessary; such guidelines should be applied here as far as possible.

Which measures for the personal protection are necessary?

Key words	Documents
Pre-warning times Alarm devices Disable devices Delay devices	Description of the respective instructions if necessary

Annex 3 Technical documentation

The extent of the technical documentation is determined by the following required measures:

- Inclusion of all used components
- Documentation of the features promised by the manufacturer (features of the components themselves as well as their interaction in the extinguishing system) including the limits for their use
- Component test
- Testing of the interaction of the components (system test)
- Testing of the constant quality of the components (product specific third party quality surveillance)

For the performance of these measures in general the following documents are necessary and have to be enclosed to the order:

- List of all components used
- Data sheets, manufacturing documents, functional descriptions as well as instructions for installation and maintenance of all components
- Schematic figure of the connection of the components (system description)
- Description of the interaction of the components (functional description of the system)

Annex 4 Planning of the fire and extinguishing tests

Already during the planning of the fire and extinguishing tests, agreements for the performance and evaluation of the tests should be made to exclude – as far as possible – subsequent questions or a subsequent devaluation of tests carried out.

Therefore, the planning of the fire and extinguishing tests shall

- take into consideration the normal operating conditions of the extinguishing system(s) and
- take into consideration operating conditions unfavourable for the extinguishing system(s) and
- verify a safety factor to the normal design of the extinguishing system(s).

Examples for safety factors, which may be derived from the fire and extinguishing tests for the subsequent design of the extinguishing system(s), are

- Guarantee for a shorter pre-burning time as in the extinguishing test,
- higher design density as in the extinguishing test,
- longer time of operation than extinguishing time in the extinguishing test as well as
- larger design quantity than in the extinguishing test

Under these aspects, the agreement for the tests shall contain the following items:

- a list of all parameters, which describe the area to be protected:
 - agreed values for these parameters (for the fire tests)
 - agreed maximum and minimum values for these parameters (for the systems to be installed later)
- a list of all parameters relevant for the planning of the extinguishing system(s):
 - agreed values for these parameters (for the fire tests)
 - agreed maximum and minimum values for these parameters (for the systems to be installed later)
- a list of the measurements to be recorded during the tests, each with all for the measurement relevant parameters like measuring accuracy, measuring time etc.
- all criteria to be fulfilled for a positive evaluation of the tests
- all criteria formally to be fulfilled by the components used
- the characteristic values of the components used to be verified before the tests
- a list of all components, which are removed from the test set-up after the extinguishing tests and are given to VdS

Annex 5 Documentation at start of procedure (example fine water spray system)

At the start of the procedure the following documents are required:

- Order **Annex D** of VdS 2344 – Procedures for testing, approval and evaluation of conformity of equipment, components and systems of fire protection and security technologies
- A **system chart** or – in case of more than one system configurations or configuration levels – several **system charts**
 - with drawing number, revision date and revision state
 - with identification of all components
 - showing the location of each components
 - showing the connections of the components
 - showing necessary information and limits/restrictions about the connections
 - showing the diameter and maximum length of pipes

Note: Several system configurations or configuration levels can be described in one system.

- **List of components** (with location/number) for the system charts, which shows all components used and their technical documentation (manufacturing drawings, data sheets etc.). also these documents shall be cited with drawing number, revision date and revision state.
- **Documentation of the components** according to list of components.
- **Description of the function of the system with amongst others:**
 - Max. working pressure of the system, incl. the different pressure levels in the system
 - Description of the interaction of the components
 - Starting sequence of the pumps (star/delta, direct-on-line, time-delayed sequential, simultaneously etc.)
 - Type of system actuation (pressure drop in pipework, manual actuation, smoke/flame detector)
 - Description of the actuation/operation sequence of the system (communication between hardware und software), i.e. at what time is which function released.
 - Manually operated functions (manual actuation, reset etc.)
 - Documentation of programs (in case of PLC controls)
- **Documentation for the fire tests**
 - Detailed test plan, incl. the scheduled time frame for the tests.
 - Detailed information on the fire test room, e.g. accreditation according to ISO/IEC 17025, geometry of fire test room, measuring technology including calibration verifications (if measurements are not performed by VdS)
 - Layout of system for the fire test. The layout shall show all components and information which is needed for the execution of the tests (e.g. length of pipes, distance between nozzles, etc.)

Note: All deviations from the VdS fire test concept – if applicable – shall be agreed with VdS-Schadenverhütung prior to the tests.

 - Data sheets of all needed combustibles as e.g Heptane, wood, expanded materials etc.
- **Draft of planning and installation manual**

Note: Depending on the case, additional information or documents not listed above may be needed. This will be decided by VdS Schadenverhütung in each individual case and the client will be informed in due time.