



Extinguishing water additive

Requirements and test methods

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VdS Guidelines for water extinguishing systems

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Requirements and test methods

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Non-binding note

These VdS-guidelines for water extinguishing systems, extinguishing water additive, requirements and test methods, VdS 3472, are only binding if their use is agreed in each individual case.

1 Scope

These guidelines specify the requirements and test methods for extinguishing water additives, which are added or fed to the extinguishing water for a water extinguishing system according to VdS CEA 4001 or VdS 2109 without being required for the extinguishing efficiency in the extinguishing concept according to the VdS CEA 4001 or VdS 2109.

Note: This includes for example extinguishing water additive for inhibition/reduction/prevention of metal corrosion, germs, bio films, development of odors etc.

Moreover, these guidelines define regulations for the approval procedure of extinguishing water additive applicable in addition to the procedure guidelines VdS 2344 and VdS 2841.

In contrast to the required extinguishing water additives which are necessary according to VdS CEA 4001 or VdS 2109 (e.g. foam concentrate, anti-freezer), the extinguishing water additives are evaluated only concerning their harmlessness and not concerning their efficiency (see table below).

Requirements	Required extinguishing water additive	Extinguishing water additive
Harmlessness	X	X
The additive must not have any negative influence on the extinguishing efficiency of the system	X	X
The additive must not have any negative influence on the flow characteristics of the extinguishing water	X	X
The additive must not have any negative influence on the materials of the system components	X	X
System-specific measures required by the additive must not have any negative effect on the system	X	X
The additive must fulfil the environmental and human compatibility	X	X
Efficiency	X	---
The additive must have the efficiency required by the extinguishing concept	X	
The mixtures fed to the system (water with additive) must be stable	X	

2 Normative References

These Guidelines incorporate, by dated or undated references, provisions from other publications. These normative references are cited in the respective positions in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to these Guidelines only when incorporated in them by amendment or revision. For undated references the latest edition of the publication referred to applies.

VdS CEA 4001 VdS CEA-Guidelines for Sprinkler systems – Planning and Installation

VdS 2109 VdS-Guidelines for Water spray systems – Planning and Installation

3 Definitions

The following definitions apply for the use of these guidelines:

Additive to extinguishing water: Substance mixed with or added to the extinguishing water in the water supply or in the pipeline network.

Required extinguishing water additive: Extinguishing water additive which is required by the extinguishing concepts according to VdS CEA 4001, VdS 2109 or VdS 2108 for the extinguishing efficiency.

Extinguishing water additive: Extinguishing water additive which is **not** required in the extinguishing concepts according to VdS CEA 4001, VdS 2109 or VdS 2108.

4 Requirements

4.1 Technical documents and specifications

The manufacturer must provide the following documents:

- a) Installation and maintenance instruction with at least following information:
 - Requirements and conditions for the use of the extinguishing water additive,
 - Single or periodic measures (system-specific and/or organizational) that are necessary or recommended to be taken during the use of the extinguishing water additive,
 - Specification of material (metallic and non-metallic) which are **not** recommended to be used with the extinguishing water additive,
 - Specification of material (metallic and non-metallic) which are recommended to be used with the extinguishing water additive
- b) EC-Safety data sheet for the extinguishing water additive
- c) Specification of the exact compounding of the extinguishing water additive (recipe)
- d) Description of the marking
- e) Comments of the manufacturer on following points:
 - Ability to extinction, see 4.2.
 - Flow characteristics (pipe flow and outflow), see 4.3.
 - Material compatibility, see 4.4.2.

- System-specific measures (if applicable), see 4.5.
- Environmental and human compatibility, see 4.6.

VdS reserve the right to request additional documents in the individual case (e.g. proof of the compatibility of materials, EC Safety data sheet for raw materials).

The technical documents are checked for completeness and sufficient information.

4.2 Ability to extinction

The extinguishing water additive in its maximum application concentration must not have any negative influence on the extinguishing properties of water.

The verification of the requirement is carried out according 5.3.

4.3 Flow characteristics (pipe flow and outflow)

The extinguishing water additive shall not affect the flow characteristics of the extinguishing water (flow in pipe network, outflow/discharge from sprinkler and nozzles, spray pattern).

The verification of the requirement is carried out according to 5.4.

4.4 Material compatibility

4.4.1 According 4.1 a) the details on material must cover the materials normally used in water extinguishing systems. The test is conducted within the scope of 5.1.

4.4.2 The extinguishing water additive must not negatively affect the component materials of the water extinguishing system.

The verification of the requirements is carried out according to 5.5.

4.5 System-specific measures

If system-specific measures (i.e. intervention in the design and technique of the extinguishing system) are associated with the use of the extinguishing water additive, these measures must not have any negative reaction to function and/or reliability of the extinguishing system.

The verification of the requirements is carried out according to 5.6.

4.6 Environmental and human compatibility

4.6.1 Only REACH-registered and REACH-conform documented raw materials may be used for the production of extinguishing water additives.

Safety data sheets have to be available for all raw materials according to REACH regulation (see also 4.1).

In principle, no raw material may be toxic (T), very toxic (T+), carcinogenic (CMR) or bioaccumulative in terms of the directive 67/548/EWG or REACH-regulation respectively. An individual case-by-case assessment is required for each exception in which it is proved that the negative classification of the raw material is not detrimental to the use of the raw material in the extinguishing water additive (preparation) (e.g. because of negligibly small concentration).

VdS reserve the right to require safety data sheets for raw materials as well as proof concerning details in the safety data sheets and to check them or have them checked respectively.

4.6.2 For the extinguishing water additive (preparation) a safety data sheet according to REACH-regulation must be available (see 4.1).

The extinguishing water additive may not be toxic (T), very toxic (T+), carcinogenic (CMR) or bioaccumulative in terms of the directive 67/548/EWG or REACH-regulation respectively.

VdS reserve the right to require proof as to details in the safety data sheets and to check them or have them checked respectively.

4.6.3 The extinguishing water additive may not present a danger for the environment and/or human life.

The verification of the requirement is carried out according to 5.7.

5 Tests

5.1 Examination of the technical documents

The test refers to the requirements in section 4.1.

The technical documents are examined for completeness and sufficient information.

5.2 Identification

The test refers to the requirements in section 4.1.

It is verified by a chemical analysis or by another suitable procedure if the composition of the extinguishing water additive complies with the specification.

5.3 Ability to extinction

The test refers to the requirements in section 4.2.

The comments of the manufacturer according to 4.1 e) are evaluated. If the comments are considered not to be sufficient proof for the fulfilment of the requirements, appropriate tests are agreed on and conducted.

Example for appropriate tests:

- Comparative tests with a defined fire scenario (tests with discharge of water and tests with discharge of the mixture of water - extinguishing water additive)

Requirement: The heat release during the discharge of water-extinguishing water additive must not exceed the heat release during the water discharge.

5.4 Flow characteristics (pipe flow and outflow)

The test refers to the requirements in 4.3.

The comments of the manufacturer according to 4.1 e) are evaluated. If the comments are considered not to be sufficient proof for the fulfilment of the requirements, appropriate tests are agreed on and conducted.

Example for appropriate tests:

- Comparative flow tests with a defined nozzle at a defined pressure (tests with water and the mixture of water-extinguishing water additive).
- Requirement: The flow during use of the mixture of water-extinguishing water additive must correspond to the flow during use of water.
- Comparative tests of distribution of extinguishing agent (analogue to water distribution tests for sprinklers) with a VdS-approved spray sprinkler (tests with water and the mixture of water-extinguishing water additive).
- Requirement: The distribution of the extinguishing agent during use of the mixture of water-extinguishing water additive must correspond to the distribution of the extinguishing agent during use of water.

5.5 Material compatibility

The test refers to the requirements in 4.4.

5.5.1 The comments of the manufacturer according to 4.1 e) are evaluated. If the comments are considered not to be sufficient proof for the fulfilment of the requirements, appropriate tests are agreed on and conducted.

5.5.2 Regardless of 5.5.1, the tests according to Annex A and Annex B are always carried out.

5.6 System-specific measures

The test refers to the requirements in 4.5.

The comments of the manufacturer according to 4.1 e) are evaluated. If the comments are considered not to be sufficient proof for the fulfilment of the requirements, appropriate tests are agreed on and conducted.

5.7 Environmental and human compatibility

The test refers to the requirements in 4.6.

The documents (see 4.6.1 and 4.6.2) as well as the comments of the manufacturer according to 4.1 e) are evaluated. If the documents and the comments are considered not to be sufficient proof for the fulfilment of the requirements, appropriate tests are agreed on and conducted.

5.8 Other tests

As far as this is necessary additional tests are conducted in agreement with the manufacturer.

6 Regulations for the approval procedure

6.1 Production quality and product surveillance

In addition to the regulations in VdS 2344 and VdS 2481 the following applies:

- In each manufacturing site one annual product audit will be carried out.
- VdS reserve the right to take a sample during the product audit and test it or have it tested to check whether the composition of the sample complies with the specification.

6.2 Product modifications

In each approval procedure it is agreed with the manufacturer if and which modifications of the product or changes in purchase or production are allowable without prior consent of VdS.

Especially the following cases are included here:

- Change of supplier of a raw material;
- Exchange of a raw material for another of same specification.

Note: The agreement shall allow modifications without involvement of VdS provided no change in the performance characteristics is expected.

With modifications requiring prior consent of VdS it will be agreed which tests and documentation are required in advance.

6.3 Modifications regarding environmental and human compatibility

6.3.1 The manufacturer has to inform VdS immediately as soon as new findings or changes of legal/official regulations have effects on the classification or use of raw materials or the extinguishing water additive. In this case it is checked if the requirements for environmental and human compatibility are still met and the approval can remain unchanged.

6.3.2 Prior to each extension of the approval it is checked by VdS if there are new findings or changes of legal/official regulations. In this case it is checked if the requirements for environmental and human compatibility are still met.

Annex A Comparative corrosion test

The tolerance for all test parameter is $\pm 5\%$, if not specified otherwise.

The test is conducted in 6 test solutions and in each case with 4 test plates:

- In each case one test solution without extinguishing water additive and one with extinguishing water additive in the user concentration recommended by the manufacturer, for the materials:
 - steel, St 37-2 bright surface (material no.: 1.0037)
 - brass 85
 - steel, St 37-2 bright surface (material no.: 1.0037) and brass 85 (together in one container)

The test plates should have a surface of approx. $2 \times 20 \text{ cm}^2$.

The „test water“ for all test solutions used is deionised water to which the following are added to one litre water:

- 72 mg $\text{Mg Cl}_2 \times 6 \text{ H}_2\text{O}$ (25 mg Cl^-/l)
- 349 mg $\text{Na}_2\text{SO}_4 \times 7 \text{ H}_2\text{O}$ (125 mg $\text{SO}_4^{2-}/\text{l}$)
- 41 mg KNO_3 (25 mg NO_3^-/l)
- 200 mg CaO

This mixture is stirred in an open container for 24 h and adjusted to a pH-value of 7,0 to 7,5 with approx. 0,1 N sodium hydroxide.

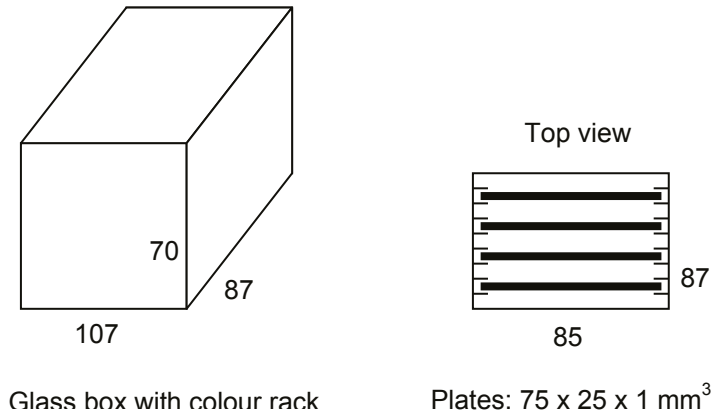
Then the test plates degreased with 1,1,2 - Trichloro - 1,2,2 - Trifluorethane are placed vertically in the respective test solutions. The volume of each test solution must be between 0,5 and 1,0 l. The liquid level in the test containers should not exceed 10 cm above the test plates. The test set is subjected to a temperature of $23^\circ\text{C} \pm 2^\circ\text{C}$ for 28 days without any stirring. The water loss resulting from the evaporation in the open containers is compensated by deionised water (pH = 7,0 to 7,5), if necessary, to avoid air contact of the test plates.

The subsequent evaluation of the test plates in direct comparison of the test solutions with and without extinguishing water additive is done by stereo microscope.

The test plates with extinguishing water additive

- should show no more than minor signs of areal corrosion;
- should be completely free from pitting corrosion or shallow pitting; and
- must not show any more signs of corrosion than the test plates without extinguishing water additive.

Model illustration of the test device



Annex B Test of rust detachment

The tolerance for all test parameter is $\pm 5\%$, if not specified otherwise.

The following shall be used for the test:

- old, heavily corroded pipes (welded and seamless)
 - with a rust layer of minimum 3 mm thickness;
 - sawn through in longitudinal direction; and
 - approx. 10 cm long.

Four such test samples are put - with tube interior facing downward - in a solution of drinking water and extinguishing water additive in the user concentration recommended by the manufacturer.

The test set is subjected to a temperature of $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 28 days with slight stirring (approx. 200 rpm). During this period the solution is heated up 13 times to 35°C at more or less regular equal intervals for periods of 8 hours.

After the test the solution is examined for detached rust particles. Particles > 3 mm must not be found. The detached particles must not stick together and must not tend towards lump formation.