



Spark Extinguishing Systems

Requirements and Test Methods

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VdS Guidelines for Spark Extinguishing Systems

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Requirements and Test Methods

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1 Scope

These Guidelines specify requirements and test methods for spark extinguishing systems (design systems) for waterbased spark extinguishing installations (assembled systems) according to the VdS Guidelines for Spark Detection, Spark Separation and Spark Extinguishing Systems - Planning and Installation -, VdS 2106.

A spark extinguishing system (design system) is a listing of components. The compatibility and the intended interaction of the components is tested in the system testing.

Components of spark extinguishing systems for waterbased spark extinguishing installations are:

- Spark detectors
- Electric control devices
- Alarm devices
- Spark extinguishing devices
- Components for the water supply (optional, for spark extinguishing installations which are not connected to water supplies of sprinkler or water spray systems)

Additional components can be used as far as they do not affect the required operation of the spark extinguishing systems.

Diagram 1 shows the schematic design of a waterbased spark extinguishing installation.

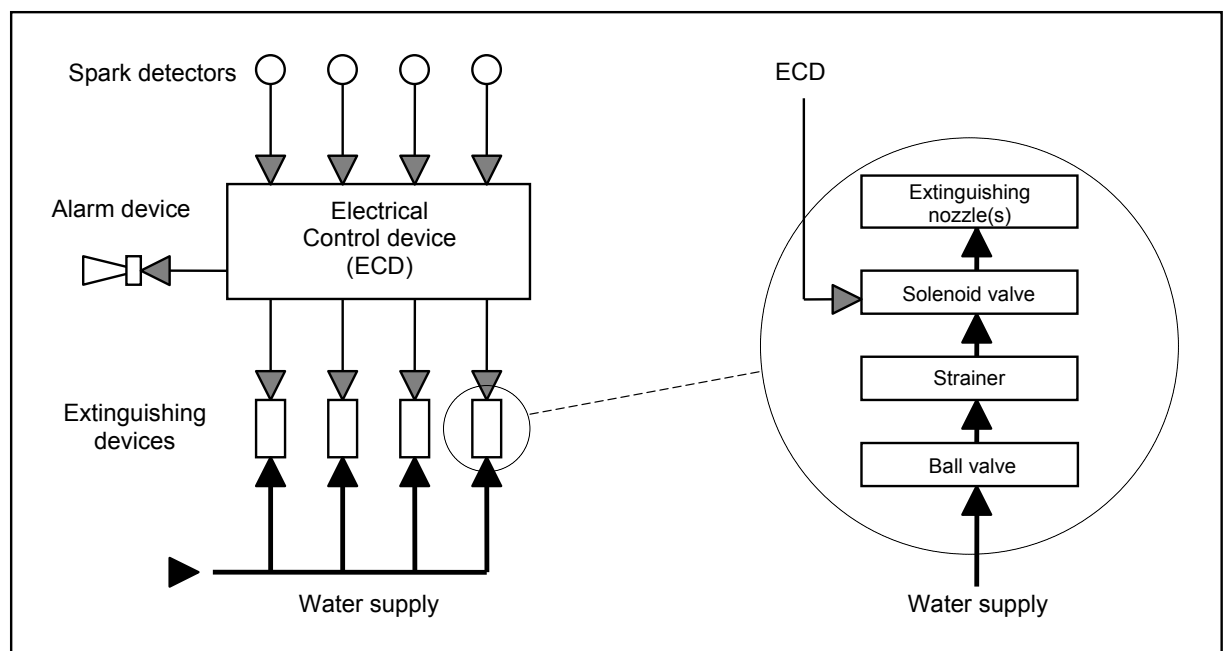


Diagram 1: schematic design of a waterbased spark extinguishing installation

All pressures stated in these guidelines are gauge pressures if not indicated otherwise.

Note: $1 \text{ bar} = 10^5 \text{ N m}^{-2} = 100 \text{ kPa}$

2 Normative References

These Guidelines incorporate, by dated or undated references, provisions from other publications. These 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 rules. For undated references the latest edition of the publication referred will apply.

- VdS 2106, VdS Guidelines for Spark Detection, Spark Separation and Spark Extinguishing Systems – Planning and Installation

3 Definitions

Following definitions apply for these guidelines:

Spark extinguishing system: System for spark extinguishing installations

System: Listing of components which were tested for proper interaction and compatibility and which can be used to design and install an installation (assembled system) according to the rules documented.

Delay time (electric): Time period between spark detection and triggering of the spark extinguishing device.

Delay time (total): Time period between spark detection and spreading of the water-spray across the whole cross section of the duct work.

Note: The delay time (total) consists of the delay time (electric) and delay time (mechanic) and is used in the design of spark extinguishing installations to calculate the distance between the spark detector and the spark extinguishing device.

Delay time (mechanic): Time period between triggering of the spark extinguishing device and spreading of the waterspray across the whole cross section of the duct work to be protected.

4 Requirements

4.1 Documentation

The documentation supplied by the applicant in German language must allow an evaluation of functional, electrical and mechanical compatibility. The following documents must be available.

Note: Documents which are already available at VdS (e.g. relating to component approvals) need not be submitted again.

4.1.1 General documentation

- List of system components (including indication of device type, device designation, VdS Approval number in case of approved devices)
- Delivery promises of manufacturers of the system components

4.1.2 Technical documentation

- List of technical documents submitted (see VdS 2344)
- System designation (Type designation)
- Technical data about system components
- System specification (features, technical scope of application, technical variants/system configurations, extension stages, regarded guidelines and regulations)
- A system description
- A function description
- Details on system extension including
 - schematic system diagram of maximum extension stage of the system
 - power demand (electric)
 - maximum number of detector groups, detectors and devices per transmission path
 - maximum number of detector groups, detectors and devices per electric control device
 - limit parameter (max. and min. parameter) for each electric inlet and outlet
 - information on communication parameter for each electric transmission path
 - cable parameter for each electric transmission path
- Block diagram of electric control device
- Connection schemes and connection instructions for the individual system components

4.1.3 User documentation

- Operating instructions
- Manual
- Installation and mounting instructions
- Configuration and commissioning instructions
- Setting instructions
- Maintenance instructions

4.2 Components

The components used in the system have to be tested as described below:

- Spark detectors according to Annex A;
- Spark control and indication equipment/electrical control devices S.c.i.e./ECD according to Annex B;
- Alarm devices according to EN 54-3;
- Spark extinguishing devices according to VdS CEA 4033;
- Pressure booster equipment according to Annex C.

Note:

Spark detectors, S.c.i.e./ECD and alarm devices can be incorporated in systems only if they have got a separate VdS Approval for components (for reasons of practicability).

As to other system components (see indents 4 and 5 above as well as further equipment, if applicable) a separate VdS Approval for components can be abandoned on request of

the manufacturer. In this case the holder of the system approval is considered as manufacturer of these components (with the responsibility to guarantee the manufacturing quality according to VdS 2344).

4.3 System

4.3.1 The documented design of the system configurations (system diagrams of the system) must ensure that the intended operation of the spark extinguishing installation is in compliance with the requirements specified in VdS 2106.

4.3.2 The system components must be technically compatible and interact as intended. All components combined to a spark extinguishing system shall be designed and connected functionally in such a way that the intended operation of the system as well as the components is ensured according to the manufacturer specifications within the limits indicated by the manufacturer as well as according to VdS 2106 and the requirements in 4.2. The functional requirements from the standards and guidelines valid for the individual devices must be fulfilled also within the system configuration(s).

4.3.3 The delay time (electric) may not exceed 10 ms.

5 Test methods

5.1 Examination of the technical documentation for completeness

The test refers to the sections 4.1 and 4.2. A visual check of the technical documentation is conducted as for receipt of the documents required.

5.2 Examination of the technical documentation for sufficient information

The test refers to the sections 4.1 and 4.2. A visual check of the technical documentation is conducted as to the information required.

5.3 Examination of used components which were tested and approved

The test refers to section 4.2. A visual check of the technical documentation is conducted as to the use of tested and approved components (see also note in 4.2).

5.4 Examination of extinguishing system design

The test refers to section 4.3.1. A visual check of the technical documentation is conducted and it is examined if the requirements of this section are fulfilled.

5.5 Examination of the technical compatibility of the used components

The test refers to section 4.3.2. It is, as far as possible, assessed theoretically by the technical documents if the different components can be functionally combined with one another within the system configuration(s) specified by the applicant and if the intended operation of the system components and thus the system itself can be fulfilled with high probability. The different extension stages of the system (e.g. number of detectors or

spark extinguishing devices) and functional conditions (e.g. disablements) as well as e.g. different operating voltages or pressures have to be considered.

Theoretical or measurement results already available about components as well as reasonable declarations of conformity by the manufacturer can be taken into account during the procedure of the theoretical test.

Following aspects are to be considered during the theoretical test, e.g.:

- Mechanic connections: evaluation of compatibility of connecting points with the connecting parts (e.g. electric clamps/cables or pipe connections)
- Electric power supply: evaluation of performance characteristics of electric system components during variations of supply parameters (e.g. voltage, current) as well as influences of faults on the transmission paths used for power supply (e.g. protection by current limiting during short circuit)
- Electric data and signal traffic: evaluation of the transmission characteristics of the transmission path between electric components of the system with minimum and maximum load conditions (e.g. voltage range, time characteristic, illustration of signal routing for sent and received data, transmission protocols within the admissible deviations)
- Electro magnetic compatibility: evaluation of the immunity of the devices within a given system configuration against electro magnetic influences (e.g. change of immunity by using other cable types)

If all parameters for the intended interaction of the components of the system or of individual components are checkable by the theoretical test and the evaluation criteria are fulfilled, it can be stated that the intended operation of the system and thus the compatibility of the corresponding components is ensured with high probability.

If this statement cannot be made on the basis of the theoretical test only, further tests in the laboratories are agreed upon and conducted.

5.6 Tests of the delay time (electric)

The test refers to section 4.3.3. It is determined by an examination of the technical documents if the requirement of this section has already been checked and fulfilled during the testing of the spark extinguishing device. If not, a test is conducted with test samples.

Annex A: Spark detectors

Requirements and test methods:

- Parts of CEA 4035
 - Requirements for function
 - Manufacturer specifies the functions of the spark detector
 - Function test
 - Conduction of a function test on the premises of the manufacturer, considering the variations of supply parameters. The function test(s) will be witnessed by VdS.
 - Environmental tests
 - Specification of a Go-Nogo-test (Actuation of detector by spark source – spark source is provided by manufacturer)

Conduction of following environmental tests:

- Cold (operational test)
- Damp heat, cyclic (operational test)
- SO₂ -corrosion (endurance test)
- Vibration (operational test)
- Vibration (endurance test)
- EMC

A response test (Go-Nogo) is conducted before and after the environmental tests.

With the EMC tests Burst, Surge and Static discharge it is tolerated:

- Flare up (flickering) of indications
- 1 extinguishing cycle
- Testing of the software documentation according to VdS 2203

General procedure

- A test schedule is established, specific to the product, considering similar features or design similarities with components already tested (e.g. flame detectors, spark detectors)

Annex B: Spark control and indication equipment/electrical control devices S.c.i.e./ECD

Requirements:

- Parts of EN 12094-1
 - Classification
 - Manufacturer specifies S.c.i.e./ECD for one of the 4 environmental classes according to EN 12094-1.
 - Use of power supply equipment according to EN 54-4
 - Functional requirements
 - S.c.i.e./ECD must fulfill the requirements for functions/indications according to VdS 2106, sections 3.3 and 3.4.

Manufacturer specifies the further functions of S.c.i.e./ECD.

Note: Requirements for manual controls/operation are only determined as far as these operations can only be provided in access level 2. If control functions are provided (e.g. disablement of detectors/detector transmission paths) this will have influence on the requirements for the indication of functional conditions (e.g. a disablement must be indicated visually).

- Function test
- Environmental tests according to EN 12094-1 (according to specified environmental class)

A function test is conducted before and after the environmental tests.

With the EMC tests Burst, Surge and Static discharge it is tolerated:

- Flare up (flickering) of indications
- 1 extinguishing cycle

General procedure

- Analogue to spark detectors

Annex C: Pressure booster equipment

Requirements:

- Manufacturer states the different sizes (different sizes in one family)
- One function test of each family is conducted on the premises of the manufacturer and witnessed by VdS.