Systems
Requirements and test methods
VdS Guidelines for Gas Extinguishing Systems

Systems

Requirements and test methods

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Declaration of non-binding status

These VdS Guidelines for Gas Extinguishing Systems, Systems, Requirements and test methods, VdS 2454en, are binding only if their application has been agreed on an individual basis.

1 Scope

For the correct function of a gas extinguishing installation it is important,

- that all components are suitable for their use in gas extinguishing installations using the specific gas.
- that connected components are technically compatible.
- that all components are combined and connected to each other in such a way that the installation operates as intended, which means that the extinguishing cycle is executed correctly in accordance with the corresponding guidelines and regulations.

These guidelines specify requirements and test methods for systems for gas extinguishing installations.

A system for gas extinguishing installations is a combination of approved components which can be used together to install gas extinguishing installations. The compatibility of the components and the correct interaction of the components is checked in the system testing.

In a system for gas extinguishing installations

- the components are listed which can be used to install gas extinguishing installations basing on this system (according to annex C).
- the configuration of the gas extinguishing installations is defined, with several standard configurations and several configuration levels, if applicable.
- the connections of the components are defined, as far as this is important for the operation of the gas extinguishing installations, i.e. the correct execution of the extinguishing cycle in accordance with the corresponding guidelines and regulations.
- are the conditions defined which have to be fulfilled when the gas extinguishing installation is triggered by a fire detection and alarm installation.

Systems for gas extinguishing installations differ in

- controlling,
- triggering,
- actuation.

These guidelines are applicable to systems where controlling, triggering and actuation are carried out

- electrically or
- pneumatically or
- mechanically or
- in combination of the above.

These guidelines should be used only as guidance in case of systems which work on different principles.

All pressure data in these guidelines are given as gauge pressure, unless otherwise stated.

*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 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 2093  VdS Guidelines for Fire Extinguishing Systems, CO₂ Fire Extinguishing Systems, Planning and Installation
VdS 2380  VdS Guidelines for Fire Extinguishing Systems, Fire Extinguishing Systems using non-liquefied Inert Gases, Planning and Installation
VdS 2381  VdS Guidelines for Fire Extinguishing Systems, Fire Extinguishing Systems using Halocarbon Gases, Planning and Installation
CEA 4008  CEA specifications for fire extinguishing systems using non-liquified inert gases – Planning and installation
CEA 4007  CEA specifications for CO₂ systems – Planning and installation
CEA 4045  CEA specifications for fire extinguishing systems using liquefied Halocarbon gases – Planning and installation
VdS 3518  VdS Guidelines for Fire Extinguishing Systems, Safety and Health Protection in Connection with Gas Extinguishing Systems
BGR 134  (Employers’ Liability Insurance Association (BG)), Regulations for safety and health protection at work, Fire extinguishing systems with oxygen-displacing gases
BGI 888  (Employers’ Liability Insurance Association (BG)), Safety devices for extinguishing systems with extinguishing gases
VdS 2496  VdS Guidelines for the Triggering of Fire Extinguishing Systems

3 Definitions

For the use of these guidelines the following definitions apply.

Actuation: Operation of container valves and selector valves.

Triggering: Transmission of signals from the control device which cause the automatic extinguishing cycle of the fire extinguishing installation (to e.g. alarm devices, delay devices, control cylinders, actuators of cylinder valves, actuators of selector valves).

Controlling: Reception, processing and transmission of signals by the control device.

CO₂-high-pressure installation: Fire extinguishing installation in which the CO₂ is stored at ambient temperature. For example, the pressure of the CO₂ in storage is \( p_{\text{abs}} = 58.6 \text{ bar at } 21^\circ \text{C}. \)

CO₂-low-pressure installation: Fire extinguishing installation in which the CO₂ is stored at low temperature, normally -19°C to -21°C.

Inert Gas: Non-liquefied gas or mixture of gases which extinguish the fire mainly by reducing the Oxygen concentration in the protected zone, like Argon, Nitrogen or CO₂ or mixtures of these gases.

Inert Gas installation: Fire extinguishing installation in which the Inert Gas is stored at ambient temperature.

Halocarbon gas: Extinguishant that contains as primary components one or more organic compounds containing one or more of the elements fluorine, chlorine, bromine or
iodine. Examples are hydrofluorocarbons (HFCs), hydrochlorofluorocarbons (HCFCs) and perfluorocarbons (PFCs).

**Halocarbon Gas installation**: Fire extinguishing installation in which the Halocarbon Gas is stored at ambient temperature.

**System scheme**: schematic diagram of the configuration of a gas extinguishing installation which can be installed based on this system.

*Note*: In one system, several standard configurations and several configuration levels can be defined. annex A shows a recommended systematics for the definition of standard configurations and configuration levels.

**System delay for alarms**: Time between the release of a non-electrical alarm energy (e.g. opening of a control cylinder) and the alarm (generation of intended sound pressure by the sounders).

**System delay for discharge**: Time between fire detection and release of the extinguishant (actuation) without the delay time set at a delay device, if applicable.

# 4 Requirements

## 4.1 General

4.1.1 Regarding the automatic fire detection, triggering and controlling for gas extinguishing installations, the following five options (1, 2A, 2B, 3A, 3B) are defined.

**Option 1:**
- The automatic fire detection, triggering and controlling is carried out by and as part of the gas extinguishing installation.
- The automatic fire detection is carried out using non-electrical fire detectors.
- The system contains all components for fire detection, triggering and controlling.

**Option 2A:**
- The automatic fire detection is not carried out by and as part of the gas extinguishing installation.
- The triggering and controlling is carried out by and as part of the gas extinguishing installation, fully or partly by an electrical control device.
- The electrical control device is designed for connection to an external control and indication equipment of a fire detection and fire alarm installation via a standard interface according to VdS 2496.
- The system does not contain any components for fire detection.
- The system contains all components for triggering and controlling.

**Option 2B**: as 2A with exception of the 3rd indent:
- The electrical control device is designed for connection to an external device not specified in the system via an interface that is defined in the system.

**Option 3A:**
- The automatic fire detection, triggering – as far as electrical – and controlling – as far as electrical – is not carried out by and as part of the gas extinguishing installation.
- The triggering of electrical devices (solenoid valves etc) in the non-electrical control device or of electrical actuators is carried out within the scope of an installerspecific common system approval according to VdS 2496.
- The system does not contain any components for fire detection, electrical triggering and electrical controlling.
- The system contains all components for non-electrical controlling.
Option 3B: as 3A with exception of the 2nd indent:

– The triggering of electrical devices (solenoid valves etc.) in the non-electrical control device or of electrical actuators is carried out by an external device not specified in the system via an interface that is defined in the system.

4.1.2 A system can cover only:

– one extinguishant;
– one system type (high pressure or low pressure);
– standard configurations for option 1 according to 4.1.1 or standard configurations for the other options according to 4.1.

4.2 Documentation

4.2.1 The documentation of the system shall contain:

– a system scheme or – in case of several standard configurations and configuration levels – several system schemes

Note: In one system, several standard configurations and several configuration levels can be defined. annex A shows a recommended systematics for the definition of standard configurations and configuration levels.

Note: The specification of the system and its standard configurations and configuration levels should be done according to annex A.

– a description of the system covering all standard configurations and configuration levels
– installation instructions
– maintenance instructions

4.2.2 The system scheme and description shall contain the following information:

– designation/name of the system,
– specification of the system (features, scope, standard configurations, configuration levels, regarded guidelines and regulations), see also 4.2.1,
– correlation of the standard configurations and hazard classes according to VdS 3518,
– identification of all components,
– illustration of location of each component,
– illustration of the connection of the components,
– necessary information and limitations about the connections,
– specification of diameter and maximum length of pneumatic control piping,
– specification of maximum number of alarm devices,
– dimension of the pneumatic energy supply depending on the relevant parameters (e.g. number of extinguishing zones, number of alarm devices),
– description of function.

4.2.3 If the system contains standard configurations for option 2A, 2B, 3A or 3B according to 4.1.1, additionally the following technical documentation shall be provided:

a) List of all components which are to be triggered electrically with specification of the triggering of these components including

– kind of component,
– type, model designation,
– manufacturer,
– nominal voltage,
– nominal power or nominal current,
– minimum and maximum voltage for function,
- current at minimum and maximum voltage,
- specified duty cycle,
- location in the system,
- function in the system,
- time of actuation,
- duration of actuation,
- essential dependencies or limitations (e.g. inhibition of reset, consideration of signals, requirements for switchover main/reserve gas supply).

b) Data sheets of the components which are to be triggered (component manufacturer data sheets), if this is not covered by the technical documentation.

**4.2.4** If the system contains standard configurations for option 2A or 2B according to 4.1.1, additionally the following technical documentation shall be provided:

a) For each electrical control device, a list of the components which are to be triggered following the systematics in 4.2.3 a) with specification of the respective triggering component (control device, printed board) and its following data
   - kind of component,
   - type, model designation,
   - manufacturer,
   - nominal voltage,
   - minimum and maximum voltage,
   - maximum current,
   - time of actuation,
   - duration of actuation.

b) For each electrical control device, a documentation of the necessary configuration (e.g. scheme of internal set-up or in case of programmable control devices a program listing).

**4.2.5** If the system contains standard configurations for option 2B according to 4.1.1, additionally a description of the interface for the connection of the electrical control device to an external device not specified in the system shall be provided.

**4.2.6** If the system contains standard configurations for option 3A according to 4.1.1, additionally the documentation necessary for an installerspecific common system approval shall be provided.

**4.3 Components**

**4.3.1 General**

**4.3.1.1** The components of the system which are listed in annex A shall be approved according to annex C.

**4.3.1.2** If the system contains also components which are not covered by annex C, an agreement is made with the applicant whether and – in case – on which basis these components shall be approved.

**4.3.1.3** Not each approved component can be used in each system. Therefore, for the selection of the components for a specific system the additional systemspecific requirements according to 4.3.2 shall be regarded.

**4.3.2 System-specific requirements**

**4.3.2.1** In standard configurations for high pressure systems only electrical control devices may be used which are tested and approved with the option „Release of the extinguishing media for selected flooding zones“. 
4.3.2.2 The indicating range of a pressure gauge should end between 1.0 times and 1.5 times the maximum working pressure (pressure developed in the container at 50 °C or the maximum pressure expected at the place of use in the installation).

4.3.2.3 Pressure gauges with colour marking for loss and pressure switches which are not temperature compensated may be used only in the cylinder storage area temperature range specified in the approval (normally from +5 °C to +25 °C).

4.4 System, technical compatibility

System components which are connected with each other shall be technically compatible. The force available for the operation of a component shall be at least twice and, in the case of pyrotechnical devices, at least thrice the force necessary for the proper function of the components.

4.5 System, installation configuration

4.5.1 General

4.5.1.1 The configuration of the standard configurations (system schemes of the system) shall ensure that the extinguishing cycle is executed correctly in accordance with the corresponding guidelines and regulations, especially also for personnel safety.

The guidelines which shall be regarded for the configuration of the standard configurations are listed in annex B.

4.5.1.2 Some requirements do not have to be fulfilled if the fire extinguishing installations are not installed according to the VdS- or CEA-Guidelines for planning and installation, see annex E.

Note: If not all requirements of the VdS- or CEA-Guidelines for planning and installation are fulfilled, the additional measures which are necessary for this use are explicitly mentioned in annex 3 of the certificate. Additionally, a reference to the limitations of annex 3 is given on the cover sheet of the certificate.

4.5.2 Specific rules for the installation configuration

4.5.2.1 It shall not be possible to interrupt an initiated flooding.

4.5.2.2 A non-electrical disable device shall be provided for each flooding zone.

Non-electrical disable devices shall be located so that

- each flooding zone can be disabled separately,
- the disablement does not affect fire detection and alarm,
- after triggering of the extinguishing system, the disablement can be reset both during the pre-warning time and after the pre-warning time, and
- upon reset of the disable device after the the pre-warning time, the flooding starts immediately.

4.5.2.3 To prevent clogging, the control gas inlet of components for pneumatic control with small internal flow ways should be equipped with sinter filters or equivalent filters.

4.5.2.4 Alarm shut-off valves (see annex D.3) shall be located so that the operation only shuts off the pneumatic alarm.

4.5.2.5 The switchover main/reserve gas supply of high pressure extinguishant cylinders should be possible by operation of just one switchover component. In exceptional cases – if technically necessary because of several cylinder banks – additional switchover components can be used.

4.5.2.6 If several single zone extinguishing installations are controlled by one electrical control device, one control cylinder shall be used per extinguishing installation – if control cylinders are used at all.
4.5.3 Personnel safety measures

4.5.3.1 In standard configurations for installations with possible risk for personnel, the personnel safety measures according to VdS 3518 for the respective hazard class shall be regarded.

4.5.3.2 In case of hazard class IV according to VdS 3518 additionally the provisions of 4.5.4 or 4.5.5 respectively apply.

4.5.3.3 Deviations are only permitted if the same safety level is ensured by equivalent other solutions.

4.5.4 Additional personnel safety measures for high pressure systems in hazard class IV

4.5.4.1 The actuation of extinguishant cylinders is carried out by non-electrical energy. This energy is released only after an adjustable delay time of a non-electrical delay device has elapsed.

4.5.4.2 The operation of the cylinder valves of the extinguishant cylinders, the operation of selector valves, if any, and the operation of the alarm devices of at least one alarm system shall be carried out from one shared gaseous control gas storage.

4.5.4.3 In the pilot line from the control gas storage to the pneumatic alarm devices, only the following valves are located:

- One manually operated shut-off valve manually operated for maintenance and test purposes which
  - can be operated only with access authorisation (e.g. case with lock), and
  - is located in such a way that the pneumatic alarm can only be disabled together with all other control processes relevant for personnel safety – especially those for triggering the non-electrical delay device and of the selector valve.
- One electrically operated valve per flooding zone for flooding zone selection which
  - is located upstream the connection to the selector valve, so that, if one selector valve is triggered, also the alarm devices of the respective flooding zone are operated in any case,
  - is triggered undelayed, and
  - once triggered locks so that after the selector valve is triggered the alarm is not affected even in case of power failure.
- One alarm shut-off valve which is
  - located in such a way that in case of operation only the pneumatic alarm is terminated.

4.5.4.4 Leak gas diverting devices shall be provided with regard to potential leakage of pneumatic valves/elements which could affect personnel safety measure.

4.5.4.5 The energy supply for pneumatic alarm is sufficient for 30 minutes alarm in case the automatic extinguishing cycle is executed as intended and is also sufficient for pre-warning alarm in all flooding zones connected to electrical control devices.

4.5.5 Additional personnel safety measures for CO₂-low pressure systems in hazard class IV

4.5.5.1 The actuation of the selector valves is carried out by pneumatic energy. This energy is released only after an adjustable delay time of a non-electrical delay device has elapsed.

4.5.5.2 The pneumatic energy for the triggering of the selector valve (or of the corresponding servo valve respectively) and of the non-electrical delay device as well as for operation of the pneumatic alarm devices (or for the triggering of the corresponding servo valve respectively) is taken from the extinguishant container via one shared connection.
4.5.5.3 Servo valves for triggering of alarm devices are used in such a way that
- if two pneumatic alarm systems are used, one separate supply line (see also 4.5.5.2)
  is installed for each alarm system, and
- as single valve a manually operated shut-off valve is located in the supply line
  between energy supply and servo valve. With closing the supply line, all other control
  processes which are relevant for personnel safety – especially the triggering of the
  non-electrical delay device and of the selector valve, are disabled, too.

4.5.5.4 In the pilot line from the control gas storage to the pneumatic alarm devices (or
the corresponding servo valve respectively), only the following valves are located:
- One manually operated shut-off valve for maintenance and test purposes that
  - is related to one flooding zone, and
  - can be operated only with access authorisation (e.g. case with lock), and
  - is located in such a way that the pneumatic alarm can be disabled only together
    with all other control processes which are relevant for personnel safety –
    especially the triggering of the non-electrical delay device and of the selector
    valve (or the corresponding servo valve respectively).
- One electrically operated valve per flooding zone for flooding zone selection that
  - is located upstream the connection to the non-electrical delay device, so that if
    the non-electrical delay device is triggered also the alarm devices of the
    respective flooding zone are operated in any case,
  - is triggered undelayed, and
  - additionally locks after triggering so that the alarm is not affected – if in case of
    power failure the quiescent condition is not reached again.
- One alarm shut-off valve that is
  - located in such a way that in case of operation only the pneumatic alarm is
    terminated.

4.5.5.5 Leak gas diverting devices shall be provided with regard to potential leakage of
pneumatic valves/elements which could affect personnel safety measure.

4.5.5.6 Manual triggering devices which are installed in pneumatic detector pipework can
be reset only with access authorisation if the reset causes also a termination of the alarm.

4.6 Flow characteristics
For individual components in the pipework downstream the manifold, flow resistance
coefficients for the hydraulic calculation shall be specified and proven. For the component
assembly consisting of the components container valve, container connection hose,
check valve and, if applicable, dip-tube of high pressure systems a common flow
resistance coefficient shall be specified.

4.7 System delay
4.7.1 Under most unfavourable conditions the system delay for discharge shall not
exceed 15 s in installations according to the documented standard configurations.
4.7.2 Under most unfavourable conditions the system delay for alarms shall not exceed
5 s in installations according to the documented standard configurations.
4.7.3 Under most unfavourable conditions the opening and closing time for selector
valves shall not exceed 3 s in installations according to the documented standard
configurations.

4.8 Power supply
4.8.1 Electrical power supplies shall be dimensioned so that even after 72 hours in the
fault warning condition one automatic extinguishing cycle can be executed and
subsequently the specified maximum number of alarm devices (sounders) can be operated for 30 min.

4.8.2 The reserve capacity for pneumatic power supplies (CO₂, air or inert gas) shall be at least five times the quantity required to execute one automatic extinguishing cycle as intended plus the quantity which is necessary to operate the specified maximum number of alarm devices (sounders) for all flooding zones for 60 s and for the individual flooding zone for a period of at least 30 min.

Note: The stop-function is not taken into account.

The minimum content of pilot pressure containers filled with shall be at least 500 g. The content of pilot pressure containers filled with CO₂ shall be monitored by a weighing device.

The content of pilot pressure containers filled with compressed air or inert gas shall be monitored by a pressure gauge or by a weighing device.

4.9 Test facilities

Provision shall be made for checking the complete function of the installations according to the documented standard configurations excluding the function of cylinder valves. If necessary special means shall be provided for this, e.g. connection for a pneumatic power supply for checking. This connection shall be designed in accordance with the VdS guidelines for planning and installation.

5 Test methods

5.1 Test of technical documentation for sufficient information

This test relates to clause 4.2. The submitted documentation shall be examined for completeness of the required documents.

5.2 Test of technical documentation for completeness

This test relates to clause 4.2. The submitted documentation shall be examined for completeness of the required information.

5.3 Test on use of approved components

This test relates to clause 4.3. The submitted documentation shall be examined for use of approved components (according to annex C).

5.4 Test on technical compatibility of the components

This test relates to clause 4.4. The submitted documentation shall be examined to determine whether all connected components are technically compatible with regard to e.g. signals, level of signals, pressure, force.

5.5 Test on installation configuration

This test relates to clause 4.5. The submitted documentation shall be examined to determine whether the requirements of this clause are fulfilled.

If an electrical control device is used, a test in accordance with 5.10 is carried out.

5.6 Test of flow characteristics

This test relates to clause 4.6. The submitted documentation shall be examined to determine whether the required flow resistance coefficients are specified. Values not specified shall be determined in tests with test samples.
5.7 Test of system delay

5.7.1 This test relates to clause 4.7. The submitted documentation shall be examined to determine whether the requirements of clause 4.7 are fulfilled. If this cannot be checked by examination of the documentation only, practical tests with test samples have to be carried out under the conditions most unfavourable for the system delay.

5.7.2 In the tests of the system delay for alarms of non-electrical control devices the number of connected alarm devices is increased compared to the specified maximum number by 50%, but not less than 1. In addition, an alarm pressure of 1.5 times the specified minimum alarm pressure or the minimum alarm pressure determined according to 5.7.3 shall be reached in the test.

5.7.3 For at least 10 pneumatic alarm devices, the alarm device inlet pressure at which the full sound level is reached is determined. The highest determined pressure is taken as minimum alarm pressure for the test according to 5.7.2.

5.7.4 Furthermore it is tested, whether the requirements on the opening and closing time for selector valves (see clause 4.7.3) are fulfilled. If necessary, the test is done under the most unfavourable conditions (e.g. maximum length of pilot line to the selector valves, minimum diameter of pilot line, actuator – selector valve – with biggest volume).

5.8 Test of power supply

This test relates to clause 4.8. The submitted documentation shall be examined to determine whether the requirements of clause 4.8 are fulfilled. If this cannot be checked by examination of the documentation only, practical tests with test samples have to be carried out.

5.9 Test of test facilities

This test relates to clause 4.9. The submitted documentation shall be examined to determine whether the requirements of clause 4.9 are fulfilled. If this cannot be checked by examination of the documentation only, practical tests with test samples have to be carried out.

5.10 Test of control by electrical control device

5.10.1 It is tested whether the electrical control is carried out in accordance with the requirements, the technical documentation and valid guidelines. If the control cannot be checked by examination of the technical documentation only, practical tests with test samples (e.g. acc. to 5.10.2 or demonstration system of approved installer) have to be carried out.

5.10.2 For the tests one test sample is needed. The test sample consists of all extinguishing system components necessary for performance and check of triggering and control (electrical control device and components to be triggered). A manual triggering device is always needed. Components which are intended to be used with identical function and identical triggering need to be provided once only.

The test sample shall be presented in the laboratory by a representative of the applicant, installed on movable mounting panels made from perforated sheet steel, ready for use and connectable to 230 V AC.

5.10.3 The technical documentation on the non-electrical part of the extinguishing system is checked regarding:

- completeness,
- unambiguous specification of installation configuration,
- use of approved components and systems,
- unambiguous requirements for the electrical control,
– completeness and correctness of the component specifications needed for the electrical triggering,
– plausibility of the time conditions specified for the electrical triggering.

5.10.4 The technical documentation on the electrical control device is checked regarding:
– completeness,
– use of approved components and systems,
– completeness and correctness of the component specifications needed for the electrical triggering.

5.10.5 On the basis of the submitted documentation it is examined whether the performance range of the triggering components covers the operating range of the triggered components.

5.10.6 On the basis of the submitted documentation and the test sample it is examined whether the test sample is sufficiently equipped and whether the test sample complies with the technical documentation.
### Annex A  Standard configurations

#### A.1  High pressure systems (CO₂, inert gas, halocarbon)

<table>
<thead>
<tr>
<th>number of FZ</th>
<th>hazard classes acc. VdS 3518</th>
<th>pre-warning time</th>
<th>design quantity per FZ</th>
<th>number n.e. DD</th>
<th>number control cylinder</th>
<th>reserve</th>
<th>cable floor separat.</th>
<th>delay</th>
<th>emergency stop function</th>
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</tr>
<tr>
<td>multi</td>
<td>class I</td>
<td>none</td>
<td>equal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>n.e./e.</td>
</tr>
<tr>
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<td>class I</td>
<td>none</td>
<td>unequal</td>
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FZ: flooding zone  DD: delay device  e., electr.: electrical  n.e., non-el.: non-electrical  n.e./e.: non-electrical and electrical
### A.2 CO₂-low pressure systems

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<th>Nachfluten</th>
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FZ: flooding zone        DD: delay device

e., electr.: electrical   n.e., non-el.: non-electrical   n.e./e.: non-electrical and electrical
Annex B  Guidelines on installation configuration

CO₂
- VdS 2093, VdS Guidelines for Fire Extinguishing Systems, CO₂ Fire Extinguishing Systems, Planning and Installation
- CEA 4007, CEA specifications for CO₂ systems – planning and installations

Inert gases
- VdS 2380, VdS Guidelines for Fire Extinguishing Systems, Fire Extinguishing Systems using non-liquefied Inert Gases, Planning and Installation
- CEA 4008, CEA specifications for fire extinguishing systems using non-liquified inert gases – planning and installations

Halocarbon gases
- VdS 2381, VdS Guidelines for Fire Extinguishing Systems, Fire Extinguishing Systems using Halocarbon Gases, Planning and Installation
- CEA 4045, CEA specifications for fire extinguishing systems using liquefied Halocarbon gases – planning and installations

All gases regarding personnel safety
- VdS 3518, VdS Guidelines for Fire Extinguishing Systems, Safety and Health Protection in Connection with Gas Extinguishing Systems
- BGR 134 (Employers’ Liability Insurance Association (BG)), Regulations for safety and health protection at work, Fire extinguishing systems with oxygen-displacing gases
- BGI 888 (Employers’ Liability Insurance Association (BG)), Safety devices for extinguishing systems with extinguishing gases

All gases
- VdS 2496, VdS Guidelines for the Triggering of Fire Extinguishing Systems
## Annex C  Component approval

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A  The component shall be tested and approved according to the respective valid test and approval basis (standard and/or VdS Guidelines)

L  The component is tested according to an agreed test schedule and approved via listing in the system.
Annex D  Additional requirements for components

D.1  Leak gas diverting devices

D.1.1  Requirements

Leak gas diverting devices shall by design be open when not pressurized or upon pressure increase due to leak gas as from max 1 mbar.

The permitted leak rate of leak gas diverting devices which close upon pressure increase in case of system actuation is 100 ml/min at a pressure of 10% of the specified minimum control pressure.

A sphere with diameter 1 mm shall be able to pass the orifice(s).

Permitted open area of leak gas diverting devices which remain open in case of system actuation: ≥ 0.7 mm² ; ≤ 4 mm²

D.1.2  Tests

A product-specific test schedule is agreed with the applicant.

The verification of the requirement that a sphere with diameter 1 mm is able to pass the orifice(s) is done by check of the technical documentation only.

D.2  Filters for pneumatic control

D.2.1  General

Sinter filter or equivalent filters should be used.

D.2.2  Requirements

The filters shall have a housing. The filters shall be made of corrosion resistant metal.

If sinter filters are used, the surface of the filter in the gas flow, divided by the porosity, shall be at least five times the sum of the flow way cross sections in the downstream pneumatic control device.

D.2.3  Tests

A product-specific test schedule is agreed with the applicant.

D.3  Alarm shut-off valves

D.3.1  Requirements

Alarm shut-off valves shall be designed so that

- the operation is possible only with access authorisation (e.g. case with lock, locked housing), and
- it is ensured by design, that the operation in the quiescent condition cannot cause permanent alarm shut-off.

D.3.2  Tests

A product-specific test schedule is agreed with the applicant.

D.4  Separate servo valves for selector valves or alarm devices

D.4.1  Requirements

D.4.1.1  Servo valves for triggering of selector valves shall be pneumatically controlled and designed so that
– in the quiescent condition the outlet „open“ to the selector valve is permanently vented; and
– in case of failure of the sealing of the permanently pressurized part the leak gas is discharged to atmosphere.

D.4.1.2 Servo valves for triggering of alarm devices shall be pneumatically controlled.

D.4.2 Tests
A product-specific test schedule is agreed with the applicant.

D.5 Separate solenoid valves

D.5.1 Requirements

D.5.1.1 Solenoid valves shall be specified for duty cycle 100% (100% ED).
D.5.1.2 Solenoid valves for selective triggering of selector valves shall be designed so that
– in the quiescent condition the outlet „open“ to the selector valve is permanently vented; and
– no dropout occurs, when the electrical energy fails (lock).
D.5.1.3 Solenoid valves for emergency stop function shall be normally closed.

D.5.2 Tests
A product-specific test schedule is agreed with the applicant.
Annex E  Deviations from the VdS- or CEA-Guidelines for planning and installation

E.1  General

This annex specifies which requirements do not have to be fulfilled if the fire extinguishing installations are not installed according to the VdS- or CEA-Guidelines for planning and installation.

Note: If not all requirements of the VdS- or CEA-Guidelines for planning and installation are fulfilled, the additional measures which are necessary for this use are explicitly mentioned in annex 3 of the certificate. Additionally, a reference to the limitations of annex 3 is given on the cover sheet of the certificate.

E.2  Components

E.2.1 The requirements of the following clauses do not have to be fulfilled:

- 4.3.2.1
- 4.3.2.2
- 4.3.2.3

E.3  System, installation configuration

E.3.1 The use of the following components can be omitted:

- electrical control device (see also 4.1),
- non-electrical disable device,
- weighing device for CO₂-fire extinguishing installations.

   Note: In this case alternative measures for loss monitoring shall be documented.

E.3.2 The following components may be used:

- manual actuators for high pressure container valves,
- control and extinguishant containers > 140 l for use in high pressure installations,
- pressure gauges for gas supply monitoring with colour marking for loss below 10% loss,
- pressure switches for gas supply monitoring with switch point below 10% loss.