



Purging units for Aspirating Smoke Detectors

Requirements and test methods

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VdS Guidelines for Fire Detection and Fire Alarm Systems

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1 Remark stating freedom from obligation

These VdS guidelines are only binding if their application is agreed between VdS and its customers in individual cases. Otherwise, these guidelines are non-binding; any agreement to apply these VdS guidelines is strictly optional. In individual cases, third parties may also accept other safety precautions or installer or maintenance companies on terms and conditions determined at their own discretion which do not comply with these technical specifications.

2 Introduction

Aspirating smoke detectors are special smoke detectors designed to suck air and aerosols with a suction unit (e.g. suction fan or pump) through a sampling device and feed this to one or several smoke sensor units.

The sampling device as an integral part of the aspirating smoke detector is a component or a combination of components (e.g. pipework, a special duct, a probe) and is in permanent contact with the air sample sucked in.

Due to the permanent transport of air sucked in, which holds aerosols and particles (e.g. dust, lint, humidity), the sampling device is subject to particular soiling and, consequently, require regular maintenance and servicing.

However, cleaning of the pipes to sampling devices installed at hard-to-reach locations is difficult.

The implementation of so-called purging units turned out to be useful to make maintenance of certain sampling devices easier and better. These systems allow manual or automatic purging-off of e.g. a pipe without any significant interruption of normal system operation.

This way, the purging unit itself becomes part of the sampling device.

Purging units shall meet particular requirements to ensure that they do not adversely affect safe and reliable operation of the aspirating smoke detector.

3 General

3.1 Scope

These Guidelines define the requirements, test methods, and performance characteristics of aspirating smoke detectors featuring purging units intended for a use in automatic fire detection and fire alarm systems inside buildings.

Purging units form integral part of the sampling devices of particular aspirating smoke detectors and can only be tested and approved in combination with the latter.

Completely manually operated purging units are not part of these guidelines.

3.2 Validity

These Guidelines shall come into effect upon publishing.

4 Normative references

These Guidelines incorporate dated and undated references to other publications (e.g. European standards EN). These are listed below.

To dated references to other publications, subsequent amendments to or revisions of any of these publications apply only when incorporated in these Guidelines.

To undated references the latest edition of the publication referred to applies.

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

EN 54-4 Fire detection and fire alarm systems – Part 4: Power supply equipment

EN 54-20 Fire detection and fire alarm systems – Part 20: Aspirating smoke detectors

5 Abbreviations

ASD: Aspirating Smoke Detector

6 Terms

To the purposes of these Guidelines, the terms of the aforementioned standards and the following definitions apply:

6.1 Purging unit

Part of a sampling device of aspirating smoke detectors designed for manual or automatic cleaning of the sampling device by means of an increased air flow generated internally by the detector or by supplying gaseous purging medium (e.g. compressed air) from the outside.

6.2 Purging process

The purging process is triggered manually or automatically and is completed when the air flow is stabilised at its target value.

7 Requirements and test methods

7.1 General

To comply with the present Guidelines, the aspirating smoke detectors and their sampling device, including the purging units subject of these Guidelines, shall meet the following:

- the relevant requirements of the product standard EN 54-20
- the requirements of these Guidelines
- purging shall not cause any fault or alarm signal on the aspirating smoke detector or any damage to the pipework

Note: Other regulations (such as the European Pressure Equipment Directive, ATEX, etc.) may apply to these products. These are not discussed further here. They are the responsibility of the respective manufacturer.

7.2 Requirements and test methods according to EN 54-20

7.2.1 Requirements

To aspirating smoke detectors and their sampling device, including the purging units subject of these Guidelines, apply all applicable requirements of EN 54-20.

7.2.2 Test methods

The test methods acc. to EN 54-20 shall be applicable.

The purging unit shall be included in the tests, taking into account a worst-case analysis, which shall be justified and documented.

I.e. the aspirating smoke detector is tested together with the purging unit (transportation time, fire tests, environmental tests, etc.).

If the aspirating smoke detector has been tested acc. to EN 54-20 before, it is allowed to subject the purging unit to a separate test using the methods defined in EN54-20. In this case, supplementary proof shall be established that the purging unit is compatible with the aspirating smoke detector to be used.

Additional components (e.g. relief valves in the pipework) shall be subjected to the test methods acc. to EN54-20 as well.

7.3 Requirements and test methods for purging units

7.3.1 Technical Documentation

7.3.1.1 Requirements

The manufacturer of the aspirating smoke detector shall supply technical documentation (e.g. user documentation) describing clearly and in unambiguous wording the proper use, the correct operation as well servicing of the purging unit to make this possible.

The intended connection to the aspirating smoke detector and/or the control and indicating equipment as well as all operating parameters (e.g. supply voltage, gaseous purging medium, power consumption) shall be specified definitely.

Moreover, the purging unit shall be described clearly by appropriate technical documents (drawings, parts lists, etc.).

7.3.1.2 Test method

The technical documentation is subject to a visual examination and engineering assessment to find it complete and suitable.

7.3.2 Electric power supply

7.3.2.1 Requirements

- a) Purging units shall be supplied out of electric power supply equipment complying with EN 54-4.
- b) Failure of the electrical power supply of the purging unit shall not adversely affect in any way the functions and the effectiveness of the aspirating smoke detector (e. g. failure of the detection capability or air flow monitoring). Failure of the purging unit is permissible.
- c) If the electrical power supply of the purging unit fails, a message can be signalled.

7.3.2.2 Test method

- a) If no corresponding test evidence is available, the power supply equipment de-signed to supply the electric power shall be tested in accordance with the re-quirements of DIN EN 54-4.
- b) Failure of the electric power supply to the purging unit shall be established during different phases of operation (stop, purging-off). It is tested whether there is any adverse effect on the functions of the aspirating smoke detector.
- c) If the option is provided, failure of the electrical power supply of the purging unit shall be caused. It shall be checked visually or metrologically whether a message has been transmitted.

7.3.3 Gaseous purging medium supply

7.3.3.1 Requirements

- a) If the purging unit features an external input for gaseous purging medium, this shall show a label marking the minimum and maximum allowed pressure.
- b) The manufacturer of the aspirating smoke detector shall deliver a manufacturer's declara-tion stating that the aspirating smoke detector as well as the sampling device, including all hardware components and sensor units, run within their limits and are not adversely af-fected as long as the purging unit is used to the intended purpose. The components shall be itemised.
- c) If the purging medium provided falls below the minimum pressure required by the manu-facturer, the purging process shall be stopped.
- d) A failure of the supply of purging medium to the purging unit shall not adversely affect in any way the functions or the effectiveness of the aspirating smoke detector (e. g. failure of the detection capability or air flow monitoring). Failure of the purging unit is permissible.
- e) Option: If the purging medium provided falls below the minimum pressure required by the manufacturer, a message can be signaled.

7.3.3.2 Test method

- a) Visual examination of the marking
- b) Checking the manufacturer's declaration for completeness and proper wording.
- c) The pressure of the purging medium is reduced to below the minimum threshold. It is verified that no purging process takes place.
- d) Failure of the supply of a flushing medium to the purging unit shall be caused during different phases of operation (quiescent mode, purging). It is tested whether there is any adverse effect on the functions of the aspirating smoke detector.
- e) If the option is provided, the pressure of the flushing medium shall be caused to fall below the minimum pressure required by the manufacturer. It shall be checked visually or met-rologically whether a message has been transmitted.

7.3.4 Functions of the purging unit

7.3.4.1 General

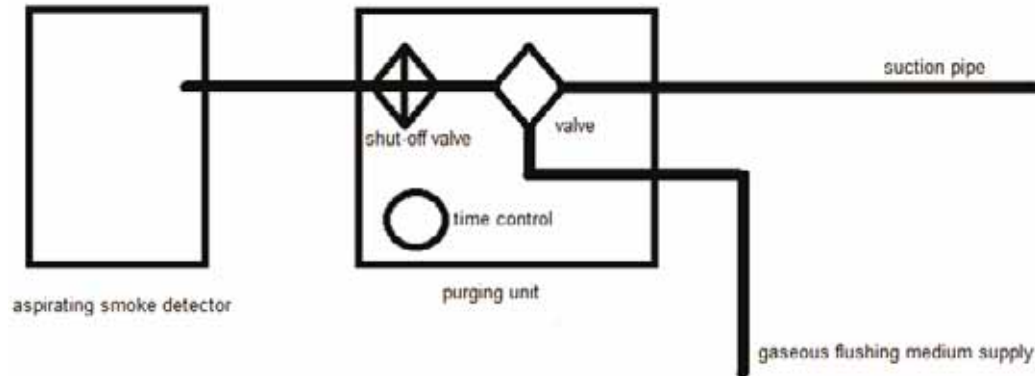
Purging units can be operated by hand controlled or automatically as follows:

- a) automatically by the control signal from the aspirating smoke detector
- b) automatically by an internal (time) control

The purging procedure starting from the quiescent condition could e.g. be as follows:

- A control signal initiates (manually or automatically) purging-off.
- To protect the aspirating smoke detector, the shut-off valve towards the ASD is closed.

- The flushing medium valve is opened and the medium flows into the suction pipe.
- Purging-off ends after a certain period and the valve closes.
- After a stabilising time, the shut-off valve towards the ASD will open again.
- The quiescent condition will be resumed.



7.3.4.2 Manually triggered purging units

The purging process (initiation of purging) is triggered manually. All control equipment (e.g. valves) is designed to work automatically and the purging duration is preset.

7.3.4.2.1 Requirements

- a) The duration of purging-off shall not exceed 300 s.
- b) Neither the alarm thresholds nor the fault thresholds of the aspirating smoke detector shall change upon initiation of purging-off.
- c) The aspirating smoke detector shall generate neither an alarm signal nor a fault signal by purging-off. Purging-off is finished only when the air flow in the aspirating smoke detector has stabilised.
- d) At the end of purging-off, the aspirating smoke detector shall automatically return into its quiescent condition.
- e) Manual control of the purging process shall be protected against unauthorised access (see access level 2, annex A of EN54-2).

7.3.4.2.2 Test method

- a) The duration of the purging process is measured.
- b) The manufacturer's technical documentation or other evidence shall be used to determine whether the alarm and/or fault thresholds of the aspirating smoke detector are changed during the purging process.
- c) Starting from the quiescent condition, the purging process is started by manual control. The aspirating smoke detector is monitored during the purging process to detect alarm and fault signals.
- d) A visual inspection and a function test are carried out to establish whether the aspirating smoke detector has returned into its quiescent condition at the end of the purging process. The purging process is finished only when the air flow in the aspirating smoke detector has stabilised.
- e) The existence of a protection against unauthorised operation is checked by visual inspection and by examination of the technical documents.

7.3.4.3 Automatically triggered purging units

All control equipment (e.g. valves) are designed to work automatically and the purging duration is preset. The purging process (initiation of purging) is triggered automatically.

7.3.4.3.1 Requirements

- a) The duration of purging-off shall not exceed 300 s.
- b) Neither the alarm thresholds nor the fault thresholds of the aspirating smoke detector shall change upon initiation of purging-off.
- c) The aspirating smoke detector shall generate neither an alarm signal nor a fault signal by purging-off. Purging-off is finished only when the air flow in the aspirating smoke detector has stabilised.
- d) At the end of purging-off, the aspirating smoke detector shall automatically return into its quiescent condition.

7.3.4.3.2 Test methods

- a) The duration of the purging process is measured.
- b) The manufacturer's technical documentation or other evidence shall be used to determine whether the alarm and/or fault thresholds of the aspirating smoke detector are changed during the purging process.
- c) Starting from the quiescent condition, the purging process is started by manual control. The aspirating smoke detector is monitored during the purging process to detect alarm and fault signals.
- d) A visual inspection and a function test are carried out to establish whether the aspirating smoke detector has returned into its quiescent condition at the end of the purging process. The purging process is finished only when the air flow in the aspirating smoke detector has stabilised.

7.3.4.4 Multichannel purging units

Purging units can be designed for sequential cleaning of several suction pipes leading to different smoke detection units.

7.3.4.4.1 Requirements

- a) The duration of the purging process shall not exceed 300 s per channel.
- b) Neither the alarm thresholds nor the fault thresholds of the aspirating smoke detector shall change upon initiation of purging-off.
- c) The aspirating smoke detector shall generate neither an alarm signal nor a fault signal by purging-off. Purging-off is finished only when the air flow in the aspirating smoke detector has stabilised.
- d) At the end of purging-off, the aspirating smoke detector shall automatically return into its quiescent condition.
- e) There shall be no adverse effect on smoke detection units that are not affected by purging.

7.3.4.4.2 Test method

- a) The duration of the purging process per channel is measured.
- b) The manufacturer's technical documentation or other evidence shall be used to determine whether the alarm and/or fault thresholds of the aspirating smoke detector are changed during the purging process.

- c) Starting from the quiescent condition, the purging process is started by manual control. The aspirating smoke detector is monitored during the purging process to detect alarm and fault signals.
- d) A visual inspection and a function test are carried out to establish whether the aspirating smoke detector has returned into its quiescent condition at the end of the purging process. The purging process is finished only when the air flow in the aspirating smoke detector has normalized.
- e) A visual inspection and a function test are carried out to establish whether there is no adverse effect on smoke detection units that are not affected by purging.

7.3.5 Environmental tests in accordance with EN 54-20

7.3.5.1 Requirements

The requirements in accordance with EN 54-20 apply.

The environmental conditioning on the purging unit shall not cause any change in the condition of the aspirating smoke detector or the purging unit.

The purging unit shall function properly before, during - if applicable -, and after exposure to the respective environmental load. Here, the tightness of valves, the atmospheric resistance, and the timing shall also be considered.

7.3.5.2 Test method

The test methods for environmental tests in accordance with EN 54-20 shall be applied.

The purging unit shall be included in the tests, taking into account a worst-case analysis, which shall be justified and documented.

In addition, a function test of the purging unit shall be carried out before, during - if applicable -, and after the respective environmental tests.

Starting from the quiescent condition, the purging process is triggered. The purging process shall not cause the aspirating smoke detector to generate neither an alarm signal nor a fault signal. The purging process is finished only when the air flow in the aspirating smoke detector has normalized.

The aspirating smoke detector is monitored during the purging process to detect alarm and fault signals. The duration of the purging process is measured.

A visual inspection and a function test are carried out to establish whether the aspirating smoke detector has returned into its quiescent condition at the end of the purging process.

The operating instructions are subject to a visual examination and engineering assessment for compliance with the requirements.

8 Marking

Each purging unit shall be clearly marked with at least the following information:

- the name or trademark of the manufacturer or supplier;
- model designation (type or number);
- Designation of the connections (e.g. terminals, pipe connections, connection for the flushing medium)

- Designation of control elements (e.g. push button for manual control);
- marking or coding (e.g. a serial number or batch code), by which the manufacturer can identify, at least, the date or batch and place of manufacture, and the version number of any software, contained within the purging unit;

Where any marking on the device uses symbols or abbreviations not in common use, then these shall be explained in the data supplied with the device.

The marking shall be visible during installation and shall be accessible during maintenance.

The markings shall not be placed on screws or other easily removable parts.

Note: Other regulations (e. g. EC Pressure Equipment Directive) may require additional mandatory markings.

Annex A Exemplary 'Manufacturer's declaration'

Company: _____

Address: _____

Manufacturer's declaration on the use of a purging unit combined with an aspirating smoke detector

Herewith, we declare with binding force that the aspirating smoke detector type _____ in combination with the purging unit type _____ operated as intended and in combination with the hardware components and sensor units below can be operated within limits in all operating conditions and is not adversely affected.

List of allowed hardware components and sensor units:

Place / date: _____

Name of the signatory: _____

Signature: _____

Stamp: