

Controllers for fans for keeping buildings free of smoke and heat in case of fire

Excerpt from VDMA standard sheet VDMA 24177

Sept. 2003

Foreword

Fans for keeping buildings free of smoke and heat (hereinafter referred to as smoke extraction fans) serve in case of fire to extract flue gases from the section affected by the fire with the aim of maintaining a low-smoke layer beneath the smoke layer over a defined period of time in order to enable persons to rescue themselves and to allow the fire brigade access for fire extinguishing and rescue actions or to establish controlled pressure differences and hence to prevent the escape of smoke into escape and rescue routes.

Motor control

Smoke extraction fans that are also used for daily ventilation can be manufactured so that they are controllable in ventilation mode.

They are almost always controlled by means of frequency controllers or dual-speed motors (Dahlander circuit or separate windings).

The motors may not be operated via frequency controllers or similar control devices in smoke extraction mode due to the increased risk of failure; instead they must be connected directly to the main distributor via the electricity network.

This does not apply if the function of the frequency controller/motor unit has been tested according to the test standards EN 12103-3 or DIN 18232-6 and carries building authority approval.

Modes of operation

Smoke extraction fans can be operated single-stage, i.e. with a single speed, or multi-stage, which means dual-speed or Dahlander circuit; this makes needs-based ventilation possible (e.g. dependent on the CO content in garages).

Further modes of operation, such as speed regulation by lowering the voltage with a transformer or control using a frequency controller are permissible only if the motor manufacture has expressly approved the motor for this.

In the event of fire it must be ensured in every case that the upstream speed controller is bridged and that operation takes place at the rated speed.

Repair switch

In accordance with DIN EN 60204-1 (VDE 0113-1) a repair switch must be provided in direct proximity to the fan for maintenance and repair work if the control cabinet is not visible from the fan.

The repair switch is to be secured in the operating position against unauthorised operation. (e.g. by a padlock or implementation as a key switch).

Control cabinet

The control cabinet is to be installed in a room separated from the smoke extraction area by means of fire protection measures.

Requirements for maintaining the function of cabling systems and distributors

The maintenance of the power supply for the smoke extraction fans must be guaranteed in the case of fire. The duration of maintenance of the function must correspond at least to the time classification of the component to be supplied. The duration of maintenance of the function of the cabling systems must be at least 90 minutes.

Electrical installation

In the case of electrically operated systems, the cables must be monitored for short-circuit, earth connection and open circuit if the operated condition is not achieved by switching off the power supply. An acoustic or visual signal on the control panel must indicate when there is an error.

The switching equipment for the smoke extraction fan must be located outside the smoke extraction area and must be accessible from escape and rescue routes.

Circuit, control, regulation

The smoke extraction case takes priority over all other functions of the smoke extraction fans.

This means that, by means of a suitable switching device

- > the fan (motor) is to be switched on
- > all the thermal and electrical monitoring elements are to be bridged or switched off
- > the fan is to be switched to the rated (usually the maximum) speed
- > speed control devices must be circumvented.

It must be ensured that the fan remains switched on after the automatic switch-on and cannot be switched off accidentally or deliberately.

This is achieved in that there are no external, freely accessible OFF switches on the switchgear and that this function is accessible only to authorised operating personnel.

Control of fans in case of fire is neither useful nor permissible - the only function of the fan is to operate for the defined time at the rated speed and delivery rate.

Monitoring, activation

The protection of persons in case of fire can be achieved only by keeping escape and rescue routes promptly and sufficiently free of smoke until the fire brigade arrives.

Particular importance is attached here to the immediate activation of the mechanical smoke extraction systems.

Therefore, smoke extraction fans must have automatic activation devices that respond to smoke (smoke detectors or smoke switches).

They can also be activated by a fire alarm system if this includes smoke detectors.

It is possible to deviate from this if smoke extraction flaps with their own sensor and activation units are part of the smoke extraction system; the smoke extraction fans must then be connected into the wiring system for the smoke extraction flap and the associated activation device. In addition it must be possible to put smoke extraction fans into operation via switch devices with manual pushbuttons.

Only activation devices with general building authority approval for the purpose of use may be used for the activation of smoke extraction fans.

Power supply

The distribution must be regulated in such a way that the power supply is retained even if the rest of the supply inside the building has been cut off in an emergency (separate isolating switch).

Controllers by HÖTE-ELECTRONIC-GMBH meet all prescribed requirements and functions and are generally accepted by the TÜV!