

Low voltage smoke extraction motors

Improving safety in tunnels



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01 West Metro, Finland

Typical applications

Smoke extraction motors are typically used in two types of applications - jet fans and axial fans:

- tunnels
- single and multi-storey shopping malls
- single and multi-storey industrial buildings and warehouses
- stairways
- enclosed car parks
- theaters
- other locations to mitigate the effects of a fire

Improving safety in tunnels

We can't undo disasters such as the fire in the Gotthard Road Tunnel in 2001. But we can, and we must, do our utmost to ensure it doesn't happen again. Key to saving lives is to start dispersing the smoke immediately and continue doing so over the duration of the fire.

Even a small fire can be extremely serious in a confined space like a tunnel. Gases and heat build fast and are difficult to disperse. Trapped in a tunnel, toxic carbon monoxide may well concentrate to fatal levels.

Heat resistant motors

Fans, and the motors that operate them, play a crucial role in reducing the deadly effects of tunnel fire. The motors must continue to operate reliably even at the high temperature of a fire zone. Because right then and there is where the fans are needed the most.

Never gamble with safety in tunnels! In case of fire, dispersing the toxic fumes quickly and efficiently can be lifesaving. It is therefore necessary to use specialized, certified smoke extraction motors for fans in tunnels and other confined spaces.

Normal motors are not equipped for the task. It takes specially designed smoke extraction motors to ensure tunnel safety. Like motors for explosive environments, smoke extraction motors are subject to strict rules and regulations.

Standards

European standard EN12101-3 specifies the requirements and test methods for ventilators and motors used in smoke and heat control ventilation systems. It also provides a procedure for approving smoke and heat control ventilators and the motors used. Standard includes special requirements for vertical mounting.

ABB has certified its smoke extraction motors according to EN 12101-03. Globally ABB complies regional requirements for smoke extraction.

Focus on safety in tunnels

Serious incidents like the fire in the St. Gotthard Road Tunnel have prompted the authorities to focus increasing attention on passenger safety, especially in long metro, rail and road tunnels. In Europe the EU has introduced Directives and standards covering smoke extraction fans for use in tunnels. These include requirements on how long and at what temperature the fans must be capable to operate in a fire. The most rigorous classification requires that the motor / fan combination will continue to operate at 400°C for two hours.

Certified for both horizontal and vertical mounting

The stresses on the bearing system during emergency duty are highly dependent on the mounting orientation of the motor. ABB incorporated this factor into the motor design and certified the motors for both vertical and horizontal mounting.

Certified for dual purpose duty

ABB's smoke extraction motors are designed and certified for both direct on line (DOL) and variable speed drive (VSD) operation, both in normal ventilation and emergency situations.

The advantage of dual purpose certification with VSD operation is that there is normally no need to bypass the VSD during an emergency.

Test procedure to get certification

According to the EN 12101-03 norm fan manufacturer is responsible for the combined ventilator and motor test in order to receive the CE marking.

ABB has executed the fire testing with a third party certification body Efectis in a fire testing laboratory.

It has been ABB's interest to have our own certificate for our biggest class of 1MW special motors, because it enables us to use the same

Class	Temperature °C, time	Duty
F200	200°C, max 120 min	DOL, VSD
F300	300°C, max 60 min	DOL, VSD
F400	400°C, max 120 min	DOL, VSD
F250	250°C. max 120 min	DOL, VSD

(acc to French degree)

proven motor construction that we have long been using in the 400 frame size certified smoke extraction motors.

ABB's smoke extraction motor range

Frame size	160 to 450
Frame material	Cast iron
Output	up to 1000 kW
Number of poles	4 to 12
Efficiency	IE2, IE3, IE4 efficiency class
Frequency	Variable speed range up to 1800 r/min
Voltage	up to 690 V

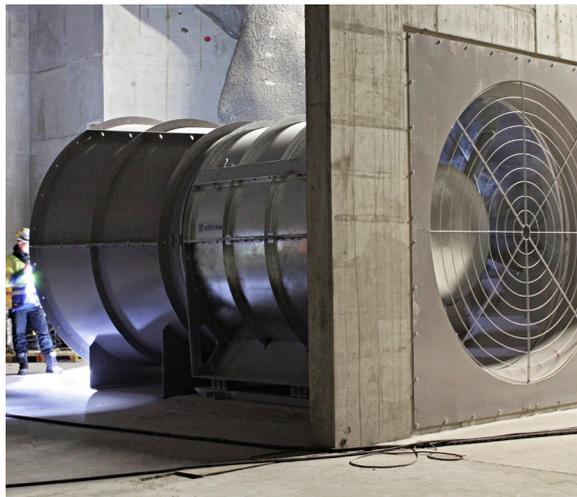
Certification

- Frame sizes 160-450 both horizontal and vertical mounting
- Certified also with angular contact or even double angular contact ball bearings because of the high axial and radial shaft forces

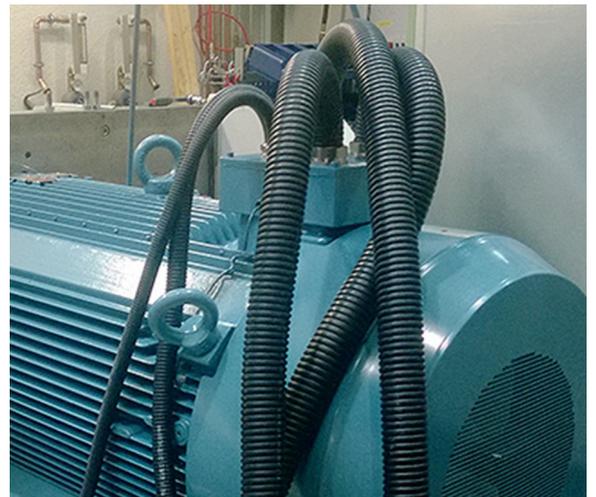
Key features

- Shaft mounted fan impeller for horizontal or vertical mounting
- Certified for dual purpose, direct online and VSD use
- Wide range of surface treatment solutions available
- Flexible cabling solutions

ABB's smoke extraction motors comply with the European standard and offer maximum performance in both normal operation and emergency conditions.



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