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ESSMANN Case Study Smoke extraction concept for low-ceilinged floors

Stang Holding stores some 500 tons of high-quality hand-made paper with a total value of about 3 million Euros in its storage cellar. The paper is stored on 1,100 pallets in a fully covered cellar that measures 1,440 m² and is just 3 metres high. The stacks of paper on the pallets reach a height of 2.70 m in some cases. If a fire were to prevent the company from being able to deliver, the consequences for the owner of the paper would be severe. A sprinkler system is not an option as it could cause water damage. The use of a natural smoke extraction system was prevented by the building above the cellar. Sufficiently large openings at the sides were not possible because of the depth of penetration of the room and the fact that a water duct runs along one of the long sides of the building. An effective smoke extraction concept nevertheless had to be developed.

ESSMANN Complete Solution



High-performance suction fan for effective smoke extraction, from ESSMANN

→ Project definition

- Smoke extraction with minor consequential damages
- Shortened smoke extraction time
- Support for the fire brigade
- Smoke extraction without the use of de-smoking channels

→ ESSMANN Solution

The only possible effective solution was therefore to use mechanical smoke extraction.

A fire detection system with both fire alarm and acoustic warning signal was installed throughout the cellar. In conjunction with the short evacuation routes, the fire detection system from ESSMANN ensures that employees, who only spend brief periods in the cellar, can save themselves.

Since a layer containing less smoke cannot form, the fumes must be transported out of the cellar as quickly as possible. A minor amount of swirling air during this process is acceptable, as is a minimal temporary accumulation of fumes at the suction points. Three ESSMANN jet fan systems were installed, which have the superior force necessary to propel the fumes very quickly towards the four suction fans installed along the lengthwise side of the building. A shaft installed at an angle opposite the suction fans provides the requisite opening for drawing in fresh air.

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→ Customer benefits

- **Mechanical smoke extraction**

The high-volume suction fans ensure the rapid extraction of smoke in case of fire.

- **Supported by jet fans**

The use of the jet fans enables a reduction of the air replacement performance stipulated by DIN 18 232 by 30,000 m³/h. The de-smoking time is nevertheless shortened by two thirds. It takes just 4 minutes to virtually eliminate all of the smoke in the cellar, thus enabling the fire brigade to attack the fire directly.

- **Smoke extraction with minor consequential damages**

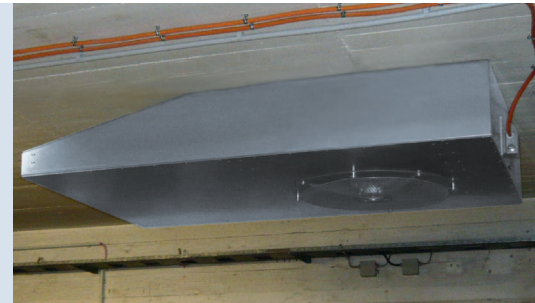
Quick detection of the source of the fire enables the fire brigade to put it out while keeping the water damage as minimal as possible. The quick extraction of the fumes minimises any smoke damage to the stored paper.

- **No need for expensive de-smoking channels**

The shorter time needed to extract the smoke justifies the marginal additional expense for the jet fans and eliminates the need for expensive de-smoking channels.

- **Smoke simulation**

Once the system was installed, a smoke simulation was performed together with the expert, the architect and the building owner. It not only confirmed the planned values; it even undercut them by a positive margin.



Jet fans with low design heights of just 300 mm from ESSMANN



Smoke test with fog machine



The room is virtually completely smoke-free after just 30 seconds, enabling the fire brigade to tackle the fire directly.

→ Result

Effective mechanical smoke extraction is possible in buildings with low-ceilinged floors if the air replacement performance is sufficient. Jet fans from ESSMANN are not just ideal for underground car parks; they also support the de-smoking speed in low-ceilinged floors where the formation of a "low-smoke layer" is questionable anyway. The use of jet fans from ESSMANN not only enables the fire brigade to tackle the fire much more quickly; they also considerably shorten the overall de-smoking time.

Further information can be found at www.essmann.de

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