

FUMIGATION OF THE CATHEDRAL OF FREISING USING SULFURYL DIFLUORIDE TO CONTROL ANOBIID BEETLES

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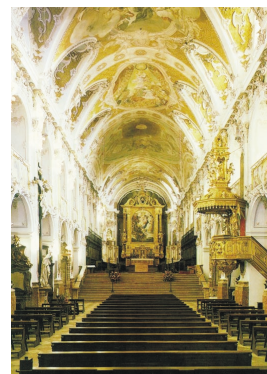
Introduction

The cathedral of Freising which has its origin in the romanic era (12. century), is one of the most important bishop-churches of Germany. The cathedral combines several epoches of history of art to a harmonic overall work of art. Especially the transformation to Baroque by the brothers Cosmas Damian and Agid Quirin Asam in the 18. Century is the prototype for the transformation to Baroque of other churches in southern Germany. During the course of the renovation of this important Bavarian Cathedral a fumigation of the entire building was carried out to control anobiid beetles (*Anobium punctatum* D.G.). Because of the rich and unique high-grade artifacts in the church it was necessary to use a fumigation-technique which ensured not to alter or tarnish sensitive materials and surfaces of the artifacts. Therefore the fumigation was carried out with highly purified sulfuryl difluoride.

The cathedral of Freising ...



... and some examples of its unique interior



Middle-nave with pulpit and altar, altar-piece by Peter P. Rubens



Sacrament-chapel, altar by Q. Ä. Asam (1738)



More than 100 windows and doors ...



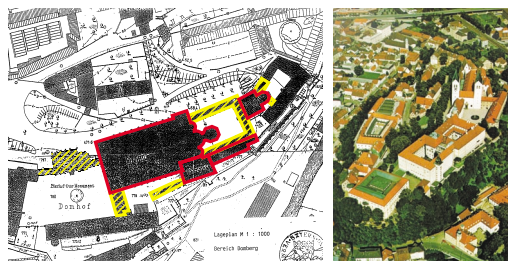
... were sealed using "tape and seal" technique.

Sealing and preparations

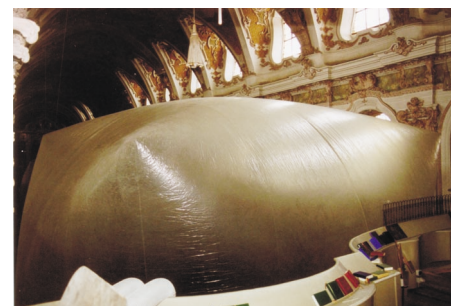
The cathedral with a volume of approximately 30.000 m³ was sealed using the "tape and seal" technique. Several powerful fans and duct-work were installed to get an even distribution of the gas during fumigation. The concentration of SF was measured at 10 different locations via monitoring lines to ensure efficiency of the fumigation and to reach 100% mortality of the target pests.

Following the new regulations of TRGS 512 several large balloons were inflated with air to reduce the volume to be fumigated¹⁾.

Several buildings and rooms had to be evacuated and closed prior to fumigation because of the wall to wall connection of the church with other structures. Since the cathedral is located in a high-density downtown area it was necessary to have several fumigation technicians supervising the fumigation sight on a 24-hour shift.



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Reduction of the volume to be fumigated using large balloons



Monitoring of the security-area during fumigation



Distribution of gas using fans and duct-work

Proof of sealing and practical fumigation

Prior to fumigation the sealing was checked by simulation of the fumigation with a tracer gas²⁾. With this test it was possible to determine the half-loss-time (HLT) of the sealed building and to get information about the ways of diffusion. Knowing the HLT, it was possible to calculate the exact amount of gas needed for a successful fumigation using a special computer-program which took into consideration all relevant fumigation-parameters (HLT, volume, temperature, exposure-time and most tolerant stage of target pest).

After passing the simulation test Vikane* was released from cylinders. The fumigant Vikane is composed of 99,8% SF and 0,2% impurities. The gas was passed through a filtering system which reduced the acid impurities in SF like Hydrogen fluoride and Sulfur dioxide to zero. This highly purified SF made sure not to alter or tarnish sensitive materials and surfaces of the artifacts.

After 74 hours exposure the church was aerated and cleared for reentry. Anobiid bioassay showed 100% control.



Installation of monitoring-lines



The filtering system



Introduction of gas

Conclusion

Purified Vikane is an ideal fumigant to control insect pests in sensitive areas like in churches or museums. The experience of the technicians, the time invested in planing and the materials used were the keys for a successful fumigation of this important cathedral without any incident.

References

- 1) TRGS 512, Juni 2004
- 2) G. Binker et. al., Der Praktische Schädlingsbekämpfer 03/04 S. 6 ff.

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