

AAF's Solution for Toilet Exhaust Ventilation System

CASE STUDY: RELEGIOUS BUILDING

Customer Profile

- Location: **Middle East**
- AAF partnered with design consultant headquartered at Egypt

Millions of worshippers across the globe visit this oldest religious building each year. This building is renovated year-on-year and designed in traditional Arabic and Islamic architecture with mesmerizing marbles & lights and is a visual treat for worshippers.

Filtration Situation

Engineers and designers have planned every inch of this holy place elegantly and aptly for the pilgrims expected all year long. The basic sanitation section was also given huge importance; hence they built a separate sanitation area for toilet and ablution purposes. This project aimed to build an additional 300 toilets for the convenience of worshippers.

Given the expected application (flushable toilets, sewage sent to sewer away from toilets, usage 15 hours per day, good housekeeping, all exhausted air mixed with fresh outdoor air, expected odour concentration of 40 OU) one approach could be to estimate all the concentrations as less than 100 ppb and separately consider ammonia from the target gases due to its high odour threshold. Apart from ammonia, other gases like methyl mercaptan, skatole, indole, and hydrogen sulphide were also concern during the design phase. Different gases (odours) may be present at the toilet than at the sewage disposal plant because the sewage is fresh at the toilet and is at various states of decomposition as it travels to and sits in the tank at the sewage disposal plant.

The resulting ratios of various gases will also be different because of the various states of decomposition. Therefore, the gases identified may be present at various areas of the application site but may not be present in the same concentrations or contaminant ratios. Apart from Odour issues being a common nuisance to tackle, the exposure to such gases even at low to medium levels can irritate eyes and respiratory tract. It can also create nervousness, dizziness, nausea, headache, and drowsiness.

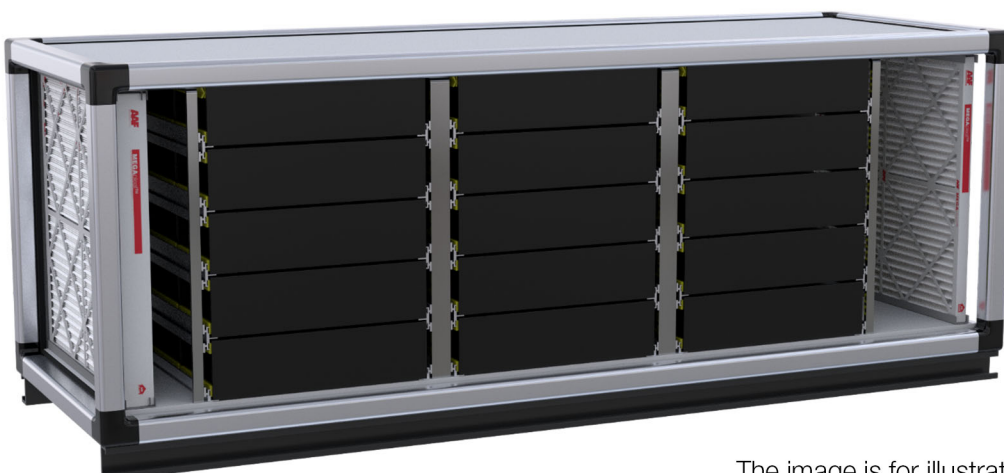
This was the major criteria of the consultant to decide on the filtration solution. The consultant would agree or disagree depending on the above parameters.

AAF International Solution

AAF has the expertise to handle complex and large projects like these. They visited the place to analyse the situation. AAF submitted a plan with 18 customized side access air purification equipment with 37,000 CFM each.

The estimated potential odour strength from each toilet is about 400 O.U. The odors from toilets will diffuse into the space air and subsequently into the toilets ventilation system. We estimate that the odours will be further diluted by a factor of 10 within the room and the ventilation system, before being discharged outside the building. The final estimated odour strength in the exhaust system (before the carbon filter) is approximately 40 O.U

Since there was no past reference for the design calculation, AAF designed and developed the estimates, which was approved by both the design consultant and the customer.



The image is for illustrative purpose only

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Field conditions are within AAF's stated application guidelines in terms of humidity and temperature. However, we wanted to rest assured about our carbon performance in-field removal efficiency and lifetime which are the major factors in deciding media selection. The selected media was for the target gases, the media performance was tested based on lab-scale testing and industry experience. Using this data, engineers at AAF calculated the performance of the media and the overall effect of this continual operation. AAF does not expect site conditions to significantly impact the performance related to the primarily chemisorbed contaminants (hydrogen sulphide, ammonia) nor the contaminant that is both adsorbed and chemisorbed (acetic acid).

Result

These units were operated from various mechanical rooms due to their large size. AAF had the flexibility of planning modular units that could be connected on site. The units were designed for a total airflow of 6,66,000 CFM (37,000 CFM each).

It includes 3 stages of gas-phase filters and 2 stages of particle filters. The quantity and selection of the media were based on the gas contaminants provided for a toilet exhaust ventilation system. The consultant approved the proposal as they were convinced by the detailed engineering conducted by the filtration experts.

Apart from the design proposal, media lab test reports, media performance reports, on-site conditions and optimizing the media life to reduce the operational cost was the positive financial benefit for the customer. The success of this project paved the way for various projects through the consultants.