

Removing Viruses and other Contamination from Indoor Air

Introduction

The Covid pandemic drastically showed the importance of efficient indoor air cleaning. This mainly involves two steps: Removal of the viruses from the indoor air and at the same time minimizing the transport from one person to another. This should be done by filtering and recirculating the air to minimize heat losses.

Filtration

Ceramic wall-flow filters have the big advantage that they can be cleaned and – in applications where hygiene is particularly important – be heated from time to time to be sterilized.

In a new generation of filters, having a hierarchic pore structure, an extremely fine-pored structure made of a ceramic material is placed upstream of each "coarse" wall pore, mimicking the process used in the formation of soot cake. These filters show a very good performance from the beginning at a reasonable pressure drop. Tests with these filters using bakteriofages as surrogate for other viruses show a very good efficiency.

Flow Regime

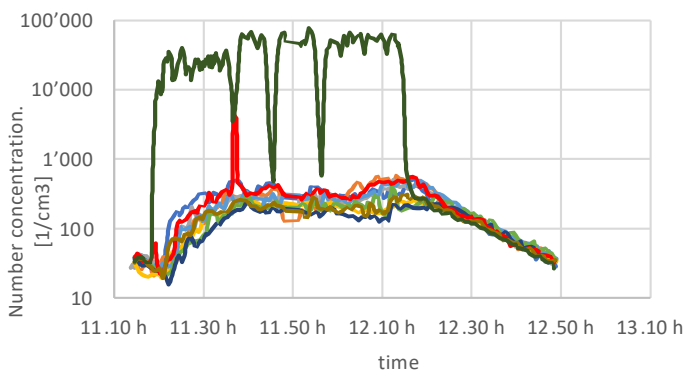
To avoid virus transport from one person to another the flow has to be as vertical, body heat leads to an upward flow, assisting the ventilation, if the flow is vertically upwards

Applications, realized so far

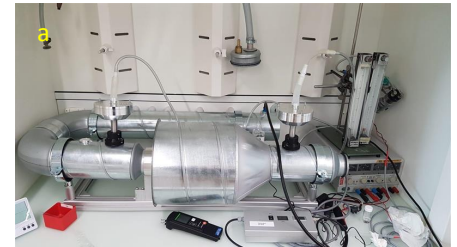
- Classroom at the Rudolph Steiner Sonderschule in Lenzburg
- Elevator Cabin at EMCH, Bern
- Baldachin for Hospital beds



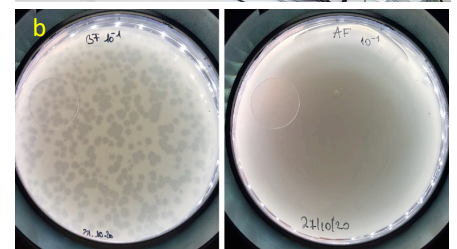
Ventilation in the classroom, air is sucked through the porous tubes at the ceiling, filtered and recirculated by the channel below the blackboard, right: filter and blower.



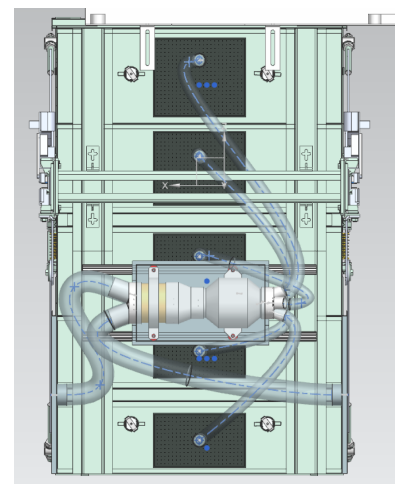
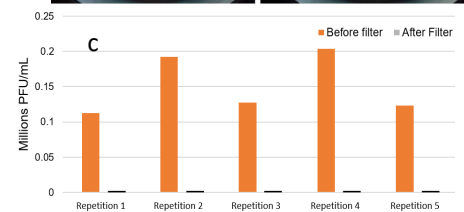
Particle concentration close to source (NaCl nebulizer, green curve) and at the desks



a. filter test bench
b. plaques, indicating the number of viruses before (left) and after (right) the filter



c. plaque count before and after the filter



Blower/filter unit on top of an elevator cabin. Compared to the particle concentration close to the source the concentration at other locations in the cabin is 5 to 10%..

Partners:



Acknowledgement:

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