

### **S1.3.4 NUMERICAL INVESTIGATION OF NON-UNIFORM PARTICLE LOADING ON PLEATED HVAC ENTRANCE FILTER PANELS**

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Pleated filter panels are widely installed as the entrance of HVAC systems for air cleaning. It has been reported that particles are not uniformly deposited on HVAC entrance filter panels. The non-uniform particle loading on filter panels often results in the reduction of lifetimes of filter panels and vacuum fans for pulling in air. This investigation is focused on the study of the particle motion and deposition on pleated HVAC filter panels, aimed to deliver effective solutions to deal with the aforementioned issues. Computer modeling were employed in this investigation to study the behavior of non-uniform particle loading on HVAC entrance filter panels. Our investigation started with a 2-D modeling to calculate the filter loading curves under the loading of monodisperse particles. The effects of pleating (i.e., pleat density and pleat height) were investigated under non-uniform particle loading conditions. The performance of pleated filter were also examined when particles were released from different locations surrounding the HVAC entrance. A 3-D numerical model was further developed to investigate the flow field and particle behavior around clean pleated HVAC entrance filter panels.