Filter Testing Case Study - F1

Development of a High Output KCl Solution Atomization System to Challenge HVAC Filter Integrity and Function

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Problem Statement

Ventilation filter manufacturers are required to confirm the efficiency claims made for their products to confirm compliance with US and Global standards.

ISO (International Standards Organization) guideline 16890, which aims to combine the requirements of other worldwide standards, ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) guideline 52.2, and numerous other regulatory and advisory bodies define the acceptance criteria for filter media types.

Testing has to challenge compliance with the worst-case scenarios to confirm that global standards are achieved or exceeded across a range of particle sizes.

Standard aerosol generation methods using multiple Laskin type nebulizers were not able to achieve the required fine particle concentration and duration of delivery needed for the filter challenge required by a major US based filter manufacturing company.

CH Technologies Standard Options

Testing is performed through the cross-sectional filter area used in air conditioning systems and at airflows specified in international guidelines.

Standard concentric jet atomizers were unable to adequately control droplet size at high output.

Single Jet Blaustein Atomizing Module (BLAM)

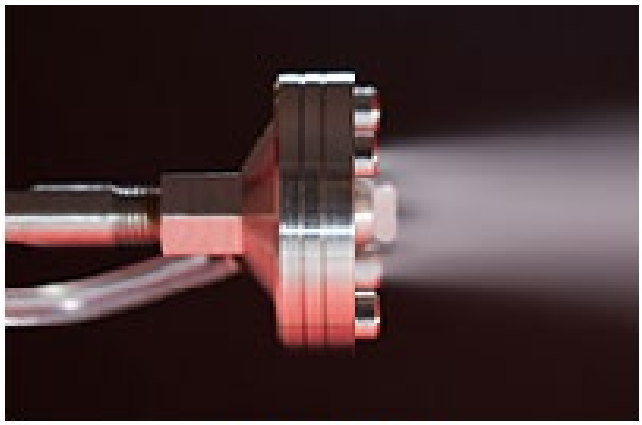
Platforms such as the Collison nebulizer, 8-jet Blaustein Atomizer (BLAM), and CENTAG Nebulizer were able to provide appropriate control over droplet size but were again unable to deliver the required output.

The standard 8-jet high output BLAM (the maximum jet number manufactured) proved able to provide the target concentration, but not at the required volumetric flow.

To overcome the concentration limitations CH Technologies scientists and engineers concluded that the scalability of the BLAM platform had the **potential** to meet client requirements.

The CH Technologies Solution

CH Technology Engineers ganged the output from six 8-jet BLAM high output atomizers into a single vessel.



8-Jet BLAM

48-Jet BLAM Atomizer

(Combination of six 8-jet units) with Drain

The combined delivery provided both the required mass of KCl particles into the volumetric airflow and was also able to maintain the necessary filter challenge fine particle size range (PM 1).

Liquid droplet output was controllable using airflow (number of nozzles actively used (between 1 and 6 of the 8-jet units), formulation concentration, and dilution airflow.

To ensure a reliable and homogenous atmosphere output from the 6 nozzles a new containment vessel for the BLAM nozzles was manufactured incorporating excess fluid drainage and single aerosol outlet.

A bubble trap was placed above the nozzles to capture and remove large droplets from the KCL aerosol effluent.

The new containment vessel ensured sufficient BLAM nozzle separation to minimize interference between the outlets and consequential aerosol droplet coalescence.

Client Outcome

An AGK salt generator (Palas, Germany) was first tested with the client's test rig but it did not achieve the target concentration and required fine/ultrafine particle ratio. The 48 nozzle BLAM unit provided the required concentration and droplet size for the required KCl salt particle testing of ventilation filters and this new platform is in routine use in our clients' test rig.

CH TECHNOLOGIES (USA)

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