

PROTECTION - SCIENCE AND TECHNOLOGY ADVANCES FOR CHEMICAL AND BIOLOGICAL PROTECTION

Point Of Use Filter For Collective Protection Applications

Lauren Sherry Guild Associates Inc Ed Soja Guild Associates Inc

Guild Associate's Point of Use (POU) filter is used to provide breathable air while removing chemical, biological, and radiological (CBRNE) agents, specifically in collective protection applications. The M98 filter is the current collective protection filtration system employed in the field and is the basis for comparison. Although the M98 filter is effective, its design is not compatible with the duct work located in ships and structures that would require its protection. Extensive alterations to an existing system would be a time consuming and expensive effort.

Two specific examples of conflict with an existing system can be measured through the high pressure drop and the excessive unit volume of the M98 filter. The dimensions of the M98 require a modified air system that can accommodate a minimum pressure drop of 4 iwg and a filter with a volume of 5.35 ft³. In comparison, the prototype POU filter unit maintains a total volume of 2.15 ft³. The filter design itself provides more surface area in the POU, which increases the volume of media per total volume to over 50%; only 13% of the M98 volume contains media. Within the POU, the media granules are immobilized within four parallel filter beds, parallel to the air feed stream. Due to the rectangular shape of the POU, the overall "dead space" decreases and allows for more media per volume available for air decontamination. Despite the increased media volume of the POU, the pressure drop is as low as 1.4 inH₂O (for 200 SCFM flow). Additionally, the individual media beds are fixed with removable lids, allowing the media to be interchangeable and customizable to any application.

As a part of proof-of-concept testing, Guild challenged the POU filter to 2,000 mg/m³ of cyclohexane with a total air flow feed rate of 200 SCFM. The POU filter successfully achieved a breakthrough time exceeding 100 minutes, consistent with results generated from the M98 filter. As previously mentioned, the POU filter maintained a similar breakthrough as the M98 filter, while requiring less space and producing a lower pressure drop. Additionally, the size and shape of the POU filter is congruent with the dimensions of most existing duct work. The POU filter does not require any extensive renovation to improve the air filtration system of any ship, buildings, control centers, or any other location that requires air filtration.