UK Nuclear Ventilation Review 2018 – 2022

NACC 2022

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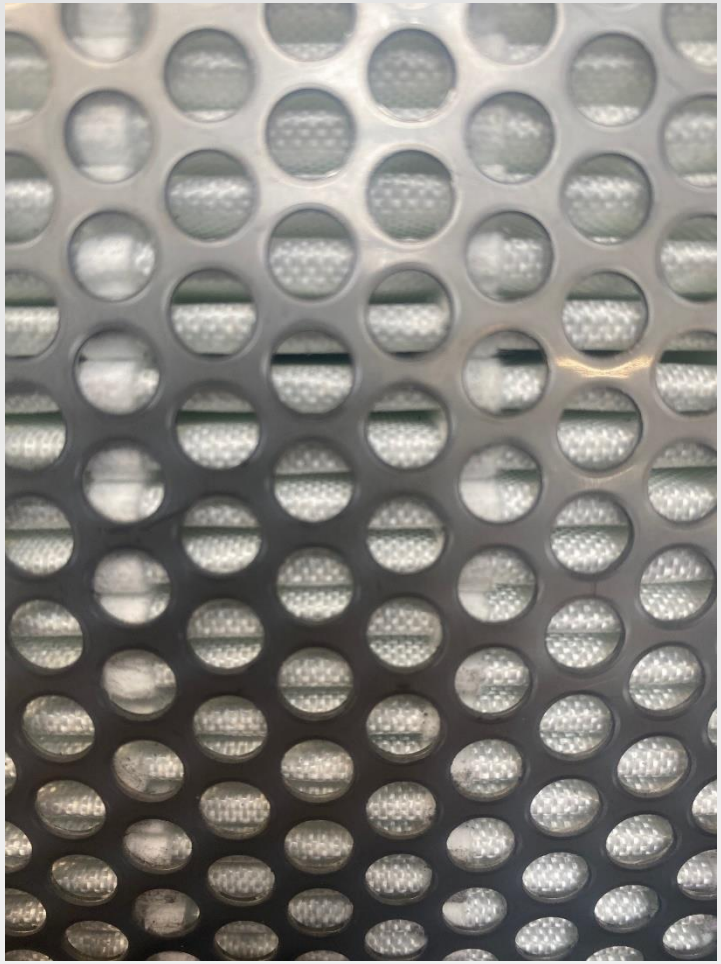
Content

- Development of high-strength glass fibre HEPA filters for the UK
- Ongoing work of the UK National Nuclear Ventilation Forum (NNVF)
- Update from the Sellafield site
- IMechE Nuclear Ventilation Conferences

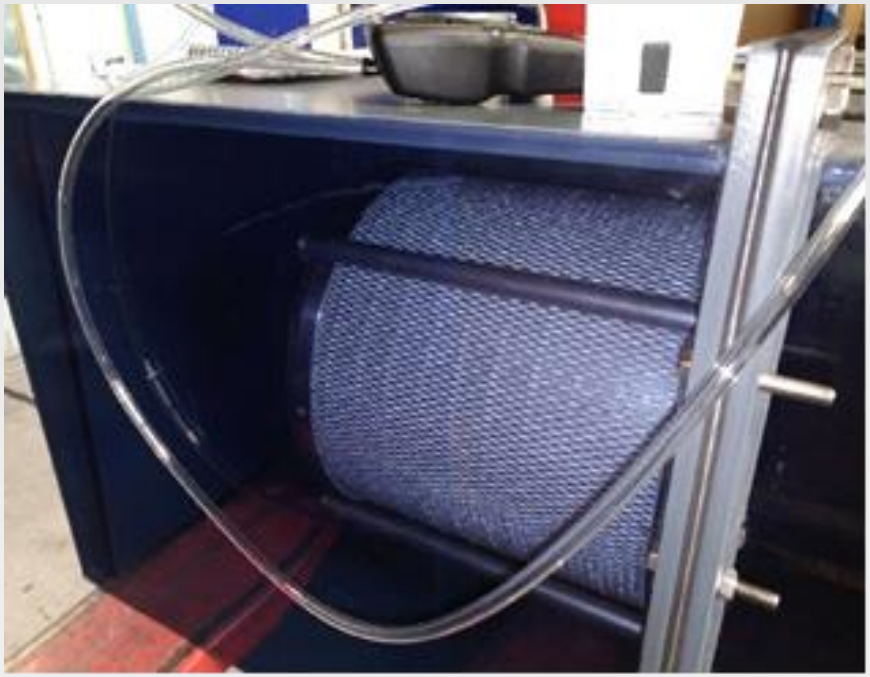
High-strength filters



Cyclic moisture testing of 160l/s high-strength radial flow filters

Photographs courtesy of Emcel Filters Ltd

Cyclic moisture testing of 160l/s high-strength radial flow filters



Photographs courtesy of Emcel Filters Ltd

Effect of moisture challenge on filter efficiency

	Recorded efficiency @ 160l/s		
	Filter 2	Filter 3	Filter 4
Pre-oven 2hrs @ 120°C	99.984%	99.987%	99.984%
Post-oven 2hrs @ 120°C	99.979%	99.974%	99.978%
Post 6 x 3mins steam challenge	99.981%		
Post 16 x 3 mins steam challenge		99.972%	
Post 48 x 3 mins steam challenge			99.969%
Post 48 x 3mins steam plus 4 days to ‘dry out’			99.982%

Tensile strength testing

Photographs courtesy of Emcel Filters Ltd

Effect of moisture challenge on tensile strength

	Average Tensile strength of samples
Raw filter media (unpleated)	27kN/m
Pleated filter media	26kN/m
Pleated filter media post 2hrs in oven @ 120°C	28kN/m
Filter 2 post oven and 6 moisture cycles	24.5kN/m
Filter 3 post oven and 16 moisture cycles	23.6kN/m
Filter 4 post oven and 48 moisture cycles	26.9kN/m

950l/s high-strength filters

Photographs courtesy of Emcel Filters Ltd

Forward work plan

- Wet pressure testing up to 12kPa of a 950l/s rated radial flow high-strength filter
- Dust loading up to 10kPa of a 950l/s rated radial flow high-strength filter
- Cyclic moisture testing on 950l/s rated radial flow high-strength filter
- Comparative cyclic moisture testing on 3 no. 160l/s rated radial flow AX3398 conventional media filters

Forward work plan (cont.)

- Investigate artificial ageing tests of high-strength pleated media and associated filters
- Manufacture rectangular axial flow 850l/s rated mini pleat high-strength filters to commence long term in-service ageing tests on ‘inactive’ air inlet systems

Forward work plan (cont.)

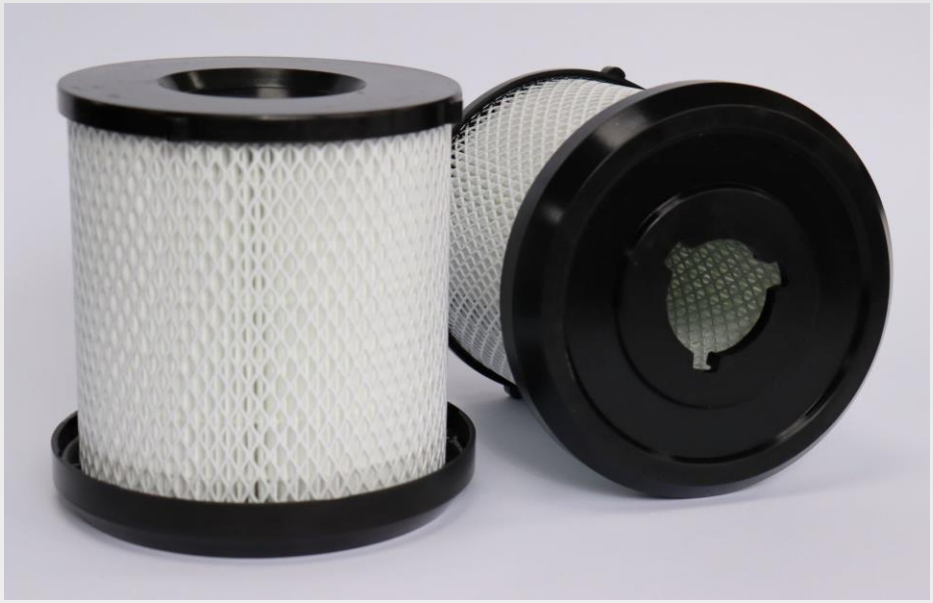
- Establish, through the UK National Nuclear Ventilation Forum (NNVF), the type testing (qualification) programme for high-strength filters

- Complete type testing of 500l/s axial flow deep pleat, 850l/s axial flow mini-pleat and 950l/s radial flow high-strength filters

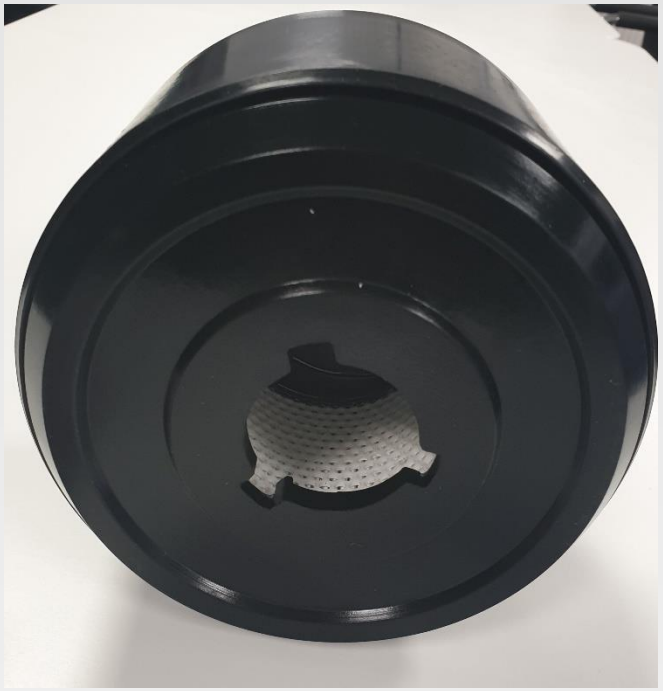
UK National Nuclear Ventilation Forum

- NNVF for nuclear site licensees, supply chain, manufacturers and Regulators to promote industry collaboration
- Sub-groups for filters, fans, AHUs and ductwork
- New standards for glove box filters
- New guide and standard for vortex amplifiers

New standards for glove box filters



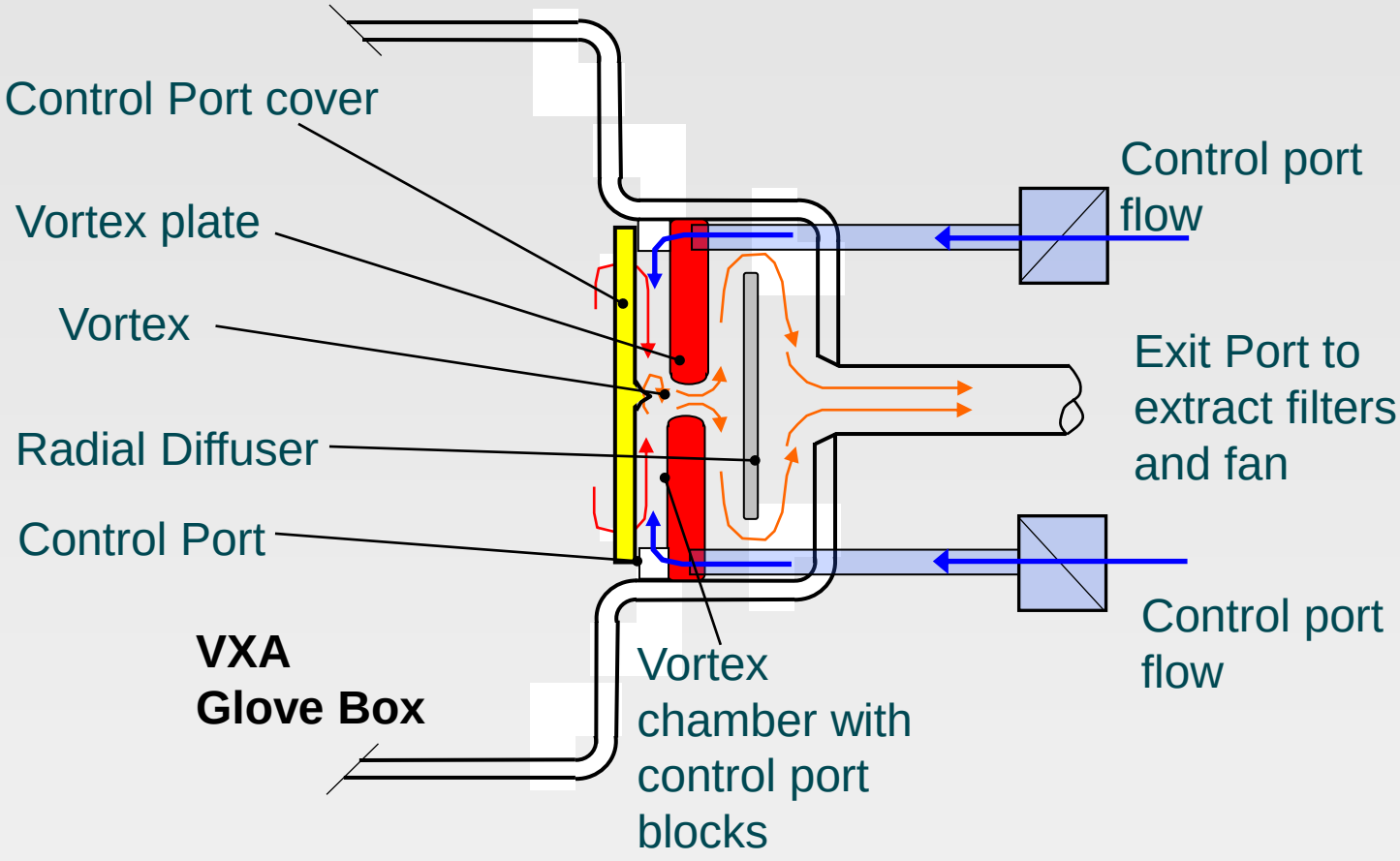
6 l/s bayonet filter



1.5 l/s bayonet canister filter

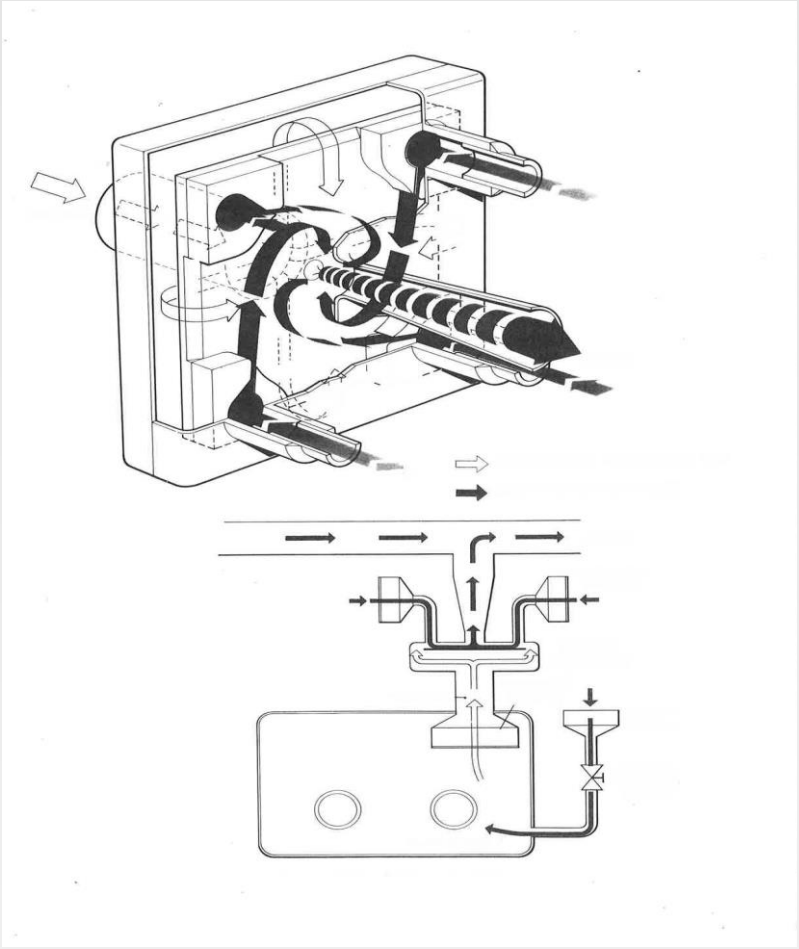
Photographs courtesy of Camfil Ltd

Vortex Amplifier development

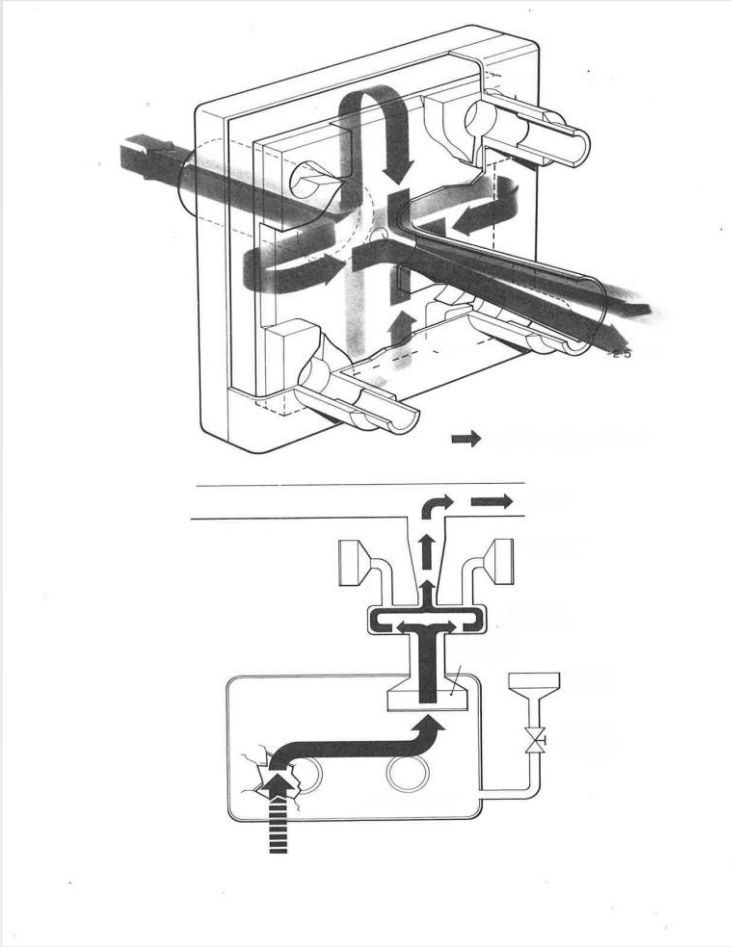


'Cut-away' view of the internals of a Vortex Amplifier (VXA)

VXA flow paths(rectangular type)

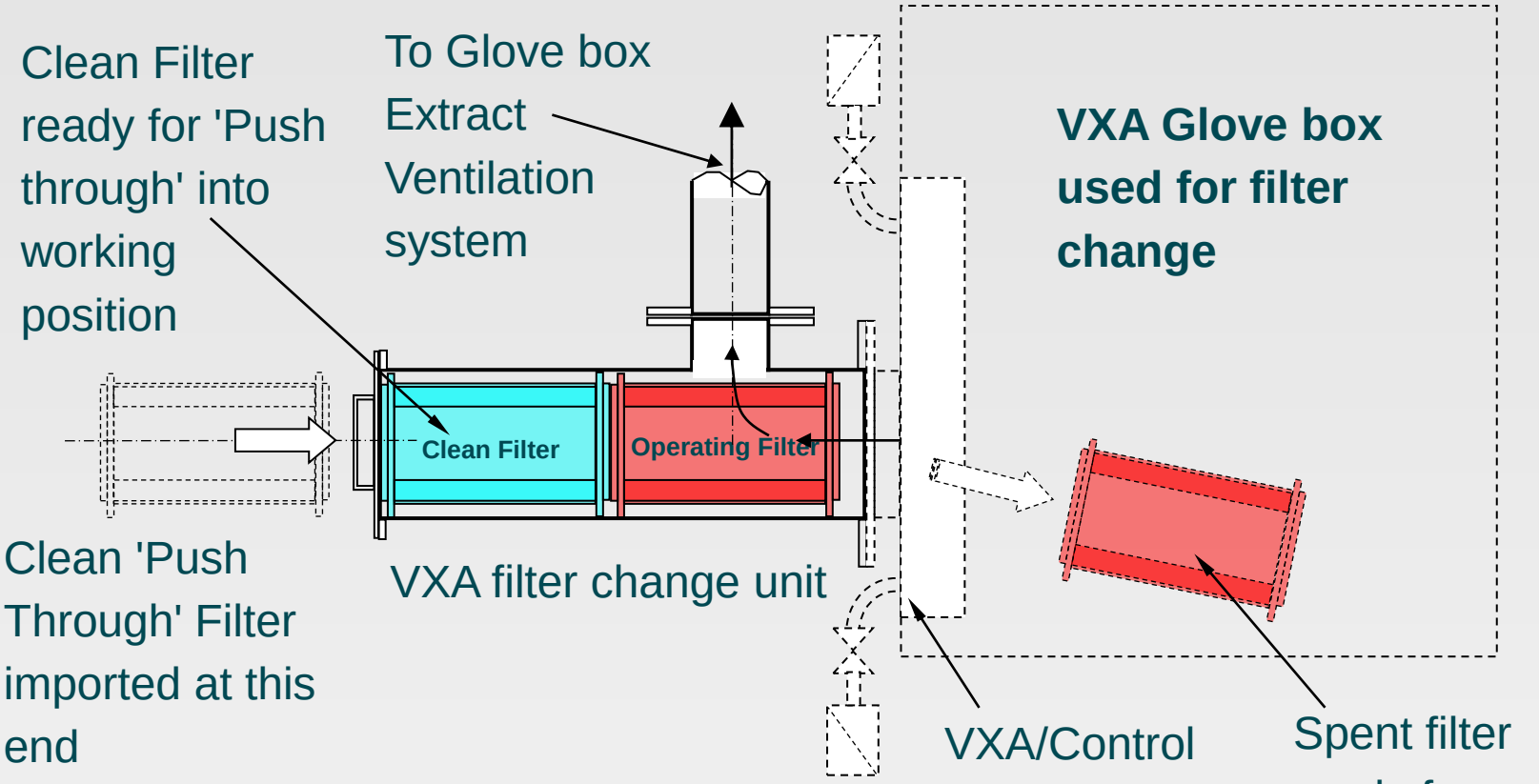


VXA normal flow

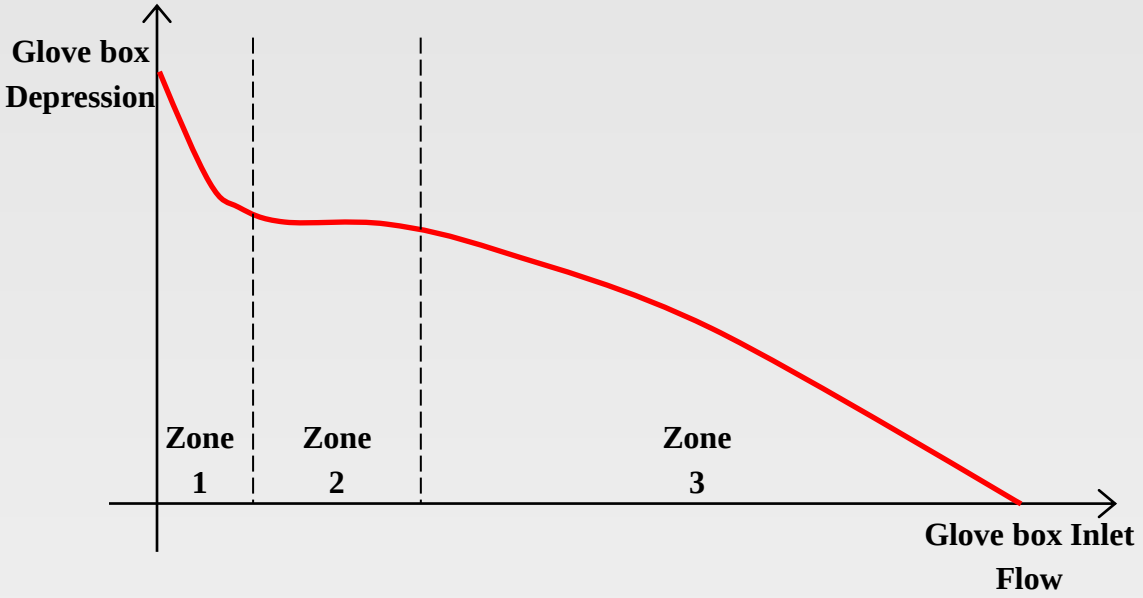


VXA breach flow

Modern VXA with local filter



New VXA Guide & Standard



Typical VXA characteristic curve

Company Standard VXA fitted to glove box

New VXA Guide & Standard

- ES_0_1706_2 Procurement Specification for Vortex Amplifiers
- Generic specification of VXAs for a normal glove box inlet flow operating range of ~ 5l/s to 12l/s
- EG_0_1706_1 Design Guide for the Specification of Vortex Amplifiers
- Covers the history & development of VXAs in the UK nuclear industry and test results for the SL company standard VXA design

Sellafield Site update

Sellafield Site update

- End of reprocessing
- Retrieval of waste from legacy ponds & silos into safe storage
- £2 billion annual budget
- Major new Projects for waste encapsulation & storage, retreatment of special nuclear materials, effluent treatment and analytical laboratories

2019 & 2021 IMechE Nuclear Ventilation Conferences

- 9th IMechE Conference in Manchester 2019
- 10th Conference held virtually Nov 2021
- Capture of particulate from laser cutting of stainless steel in decommissioning
- HVAC systems on Hinkley Point C – 3.2GW EPR in construction

Thank you