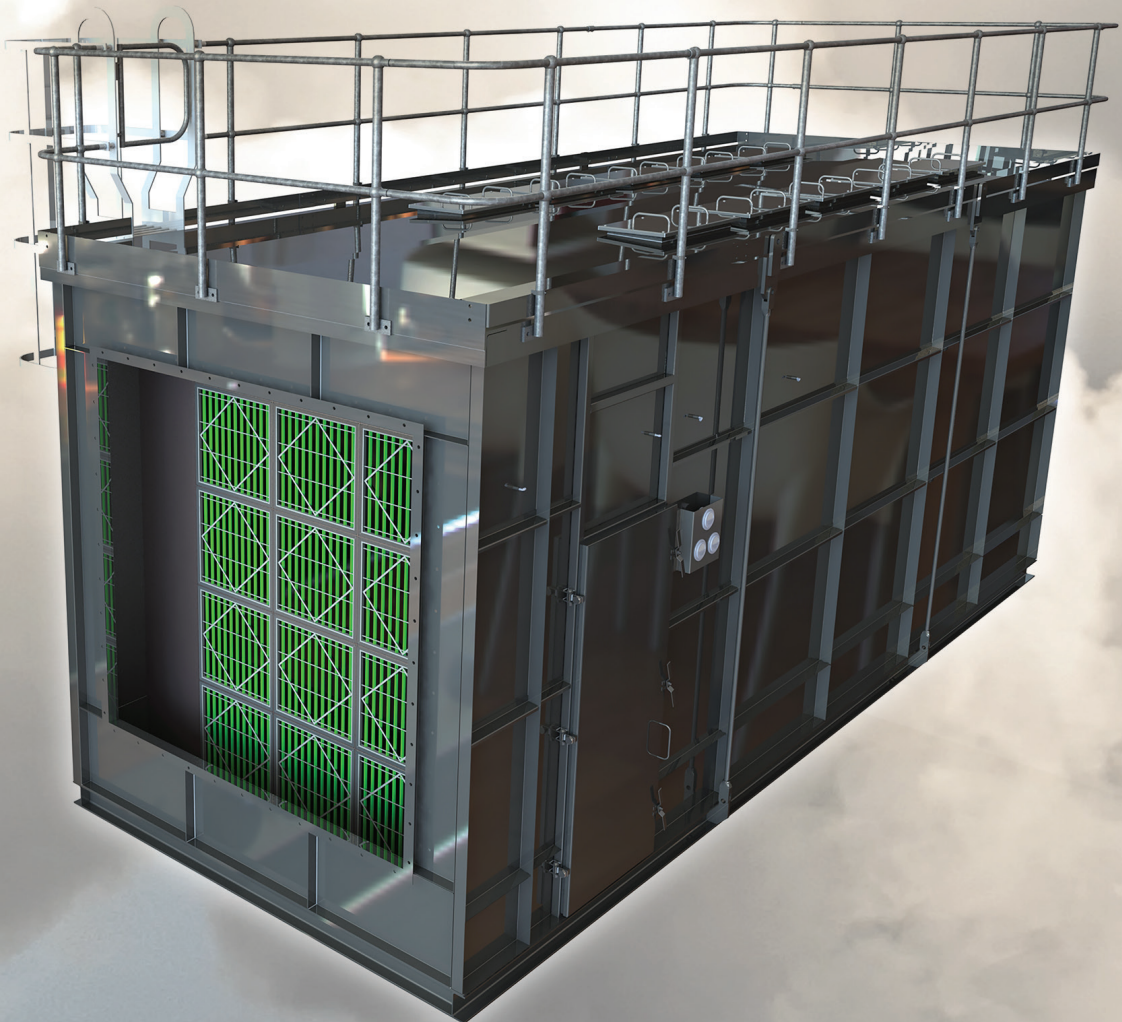




PROCARB VERTICAL DEEP BED FILTER (VDBe)

Molecular filtration solutions for industrial exhaust air applications

Metric



Clean air solutions

PROCARB VERTICAL DEEP BED FILTERS (VDBe)

INTRODUCTION

Vertical Deep Bed Exhaust filters (VDBe) are members of the Camfil “ProCarb” range of industrial molecular filtration solutions.

This product is designed to ensure the very highest levels of performance in those applications where the elimination of toxic gases and odours is essential for operational security and/or regulatory compliance.

Performance is delivered in terms of extremely high removal efficiency and the longest possible lifetime per fill of filtration media. Standard features ensure reliable and safe operation.

Two equipment configurations are available with airflow capacities ranging from 10,000 to 105,000 m³hr⁻¹.

Virtually any molecular filtration media may be selected for use in the filters, depending on the contaminant(s) to be controlled.

VDBe filters are completely passive in operation and require very little routine maintenance apart from changing filters and media at the end of their life.

OPTIONS:

- Stainless steel construction
- Pressure gauges with electrical switches and alarms
- Light in pre-filter section
- Temporary dust filter (carbon filling)
- Customer selectable color

APPLICATIONS

Many commercial and industrial processes generate chemical pollutants. Often these chemicals are classified as either odours, irritants or in the worst case toxins or poisons. In other words they have the potential to impact humans and the environment on a scale from “nuisance” to “fatality”.

To protect process operators, health and safety regulations normally demand that chemical pollutants are collected in a “local exhaust ventilation” (LEV) air system. After the pollutants are effectively collected in the LEV system, environmental concerns might require their removal before the exhaust air is discharged to the external atmosphere.

To eliminate odour nuisance or achieve compliance with regulatory requirements, it is likely that any abatement solution will

have to operate on a single-pass basis with extremely high efficiency.

It is logical that a molecular filter installed in an exhaust air system must be a robust device. Normally this means deploying a relatively large amount of filtration media and ensuring leak-free operation. This is the intended application for Camfil ProCarb VDBe filters.

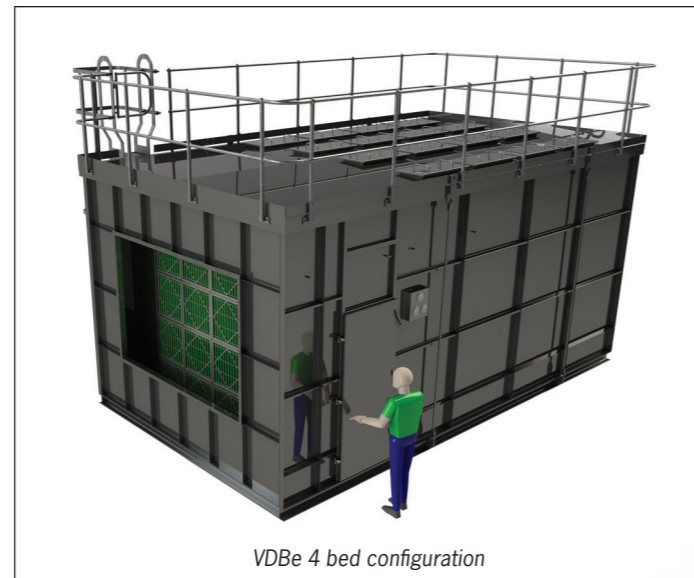
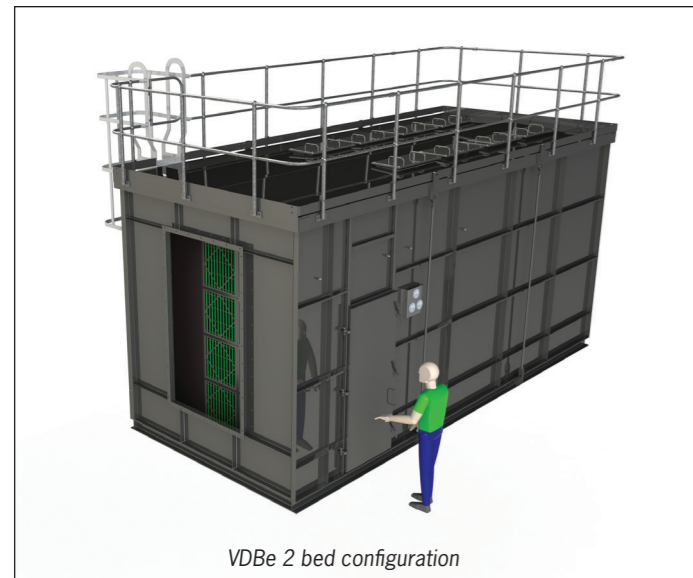
Camfil have more than 30 years’ experience in the design, manufacture and installation of molecular filters for industrial exhaust air applications. In addition to the

product, a successful project requires an understanding of the customer process, applicable health and safety requirements and any regulatory requirements relating to environmental protection.

The ultimate goal is to provide a molecular filtration solution that meets all regulatory requirements, but with little or no impact on the customer process.

In particular, ProCarb VDBe filters have been specifically designed to have the very minimum maintenance requirements and when these procedures are required, they are safe, quick and clean as possible for operators.

Camfil offer to provide just the filtration solution or a turn-key project.

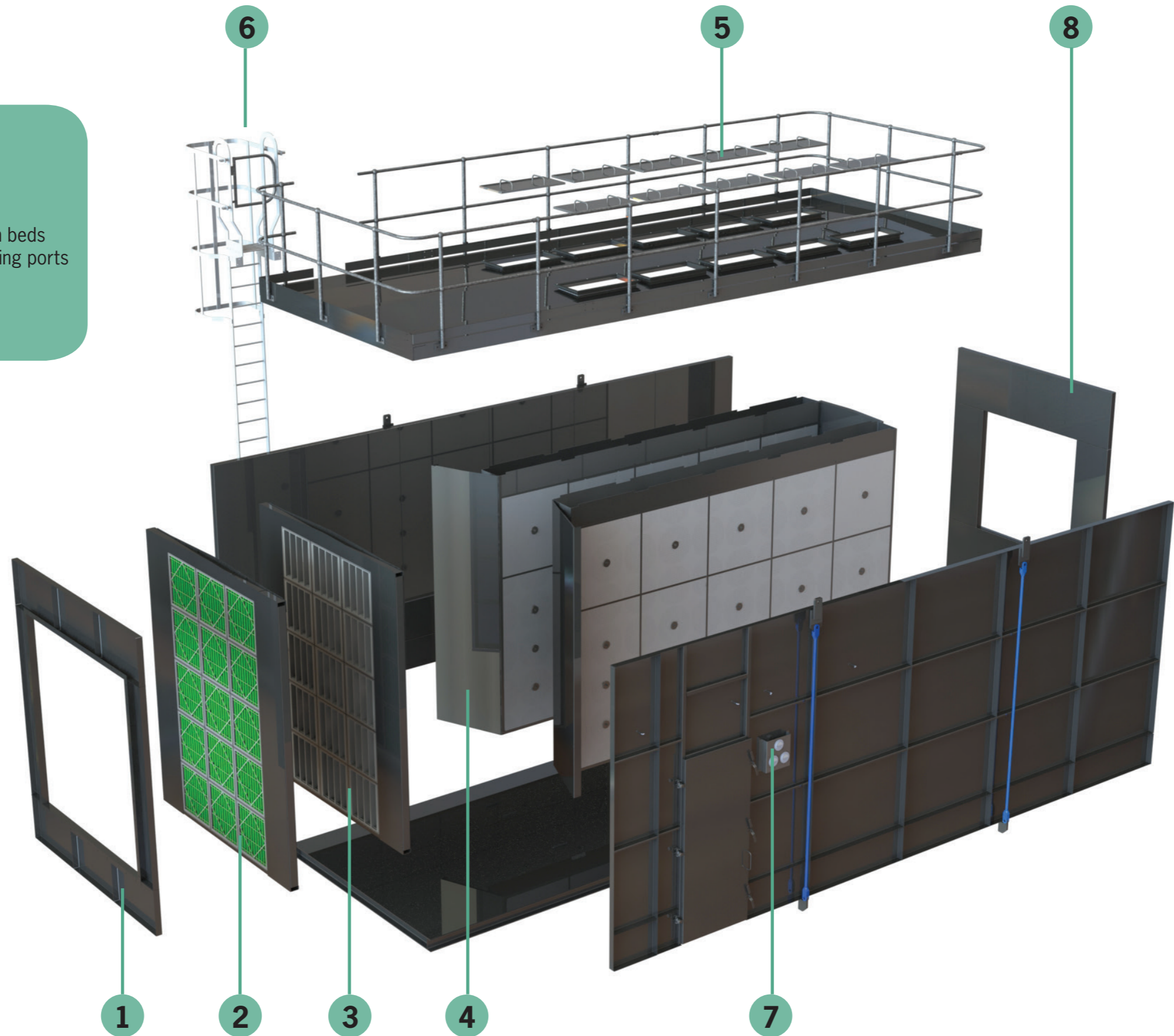


FEATURES	CUSTOMER BENEFITS
Long contact time to ensure optimum media usage and lifetime.	Lowest possible life cycle cost (LCC).
Inherently leak-free design.	Highly reliable performance.
Media compartments have the same volume as a Supa-sack.	Simple, safe and clean procedure to fill filter with media
Integrated pre-filter.	Safe and easy routine maintenance access.
Access ladder and hand rail.	Safe and easy routine maintenance access.
Large area footprint and structural base.	Minimum requirement for concrete or steel foundation.
Carbon contact parts from 316 quality stainless steel.	Corrosion resistant.
Magnahelic pressure loss gauges for all filter stages.	Easy to establish conditions of pre-filters and filter media, allowing time to plan maintenance.
Painted carbon steel construction.	Robust protection against the elements.

EXAMPLE INDUSTRIES	TARGET GASES
Flexible polyurethane foam manufacture	Isocyanates, e.g. toluene diisocyanate
Domestic waste collection, processing and re-cycling	A very complex range of organic molecules, e.g. hydrocarbons, alcohols, aldehydes
Chemical processing	Extremely wide range of possibilities
Food processing	Garlic and chilli odours, allicin and capsaicin



- ITEM LIST:**
- 1 Air inlet flange
 - 2 1st stage pre-filter
 - 3 2nd stage pre filter
 - 4 Stainless steel carbon beds
 - 5 Carbon filling / emptying ports
 - 6 Access ladder
 - 7 Pressure loss gauges
 - 8 Air outlet flange



TECHNICAL DATA TWO MEDIA BED CONFIGURATION (VDBe2)

Airflow [m3/h] 1	Model	Dimensions [mm] 2	Pre-filter quantity 3	Pressure drop [Pa] 4	Unit weight [kg] 5
14,000	VDBe2-2-LP-14000	5000 x 2900 x 2535	6	1,100	9,000
20,000	VDBe2-3-LP-20000	6000 x 2900 x 2535	6	1,100	11,000
28,000	VDBe2-4-LP-28000	7000 x 2900 x 2535	12	1,100	13,000
34,000	VDBe2-5-LP-34000	8000 x 2900 x 2535	12	1,100	15,000
22,000	VDBe2-3-HP-22000	6000 x 2900 x 3545	10	470	12,000
30,000	VDBe2-4-HP-30000	7000 x 2900 x 3545	10	470	14,000
37,000	VDBe2-5-HP-37000	8000 x 2900 x 3545	15	470	17,000
44,000	VDBe2-6-HP-44000	9000 x 2900 x 3545	15	470	19,000
52,000	VDBe2-7-HP-52000	10000 x 2900 x 3545	20	470	23,000

Notes:

- Rated airflow at 1 second contact time
- Overall approximate dimensions
- Filters 600 mm x 600 mm
- Estimated pressure drop across molecular filtration media LGS048 activated carbon
- Estimated maximum weight during use. Please refer to technical drawings for detailed information

TECHNICAL DATA FOUR MEDIA BED CONFIGURATION (VDBe4)

Airflow [m3/h] 1	Model	Dimensions [mm] 2	Pre-filter quantity 3	Pressure drop [Pa] 4	Unit weight [kg] 5
28,000	VDBe4-2-LP-28000	5000 x 3900 x 2535	9	1,100	13,000
40,000	VDBe4-3-LP-40000	6000 x 3900 x 2535	15	1,100	18,000
56,000	VDBe4-4-LP-56000	7000 x 3900 x 2535	18	1,100	21,000
60,000	VDBe4-4-HP-60000	7000 x 3900 x 3545	20	470	23,000
74,000	VDBe4-5-HP-74000	8000 x 3900 x 3545	25	470	28,000
88,000	VDBe4-6-HP-88000	9000 x 3900 x 3545	30	470	32,000
104,000	VDBe4-7-HP-104000	10000 x 3900 x 3545	30	470	36,000

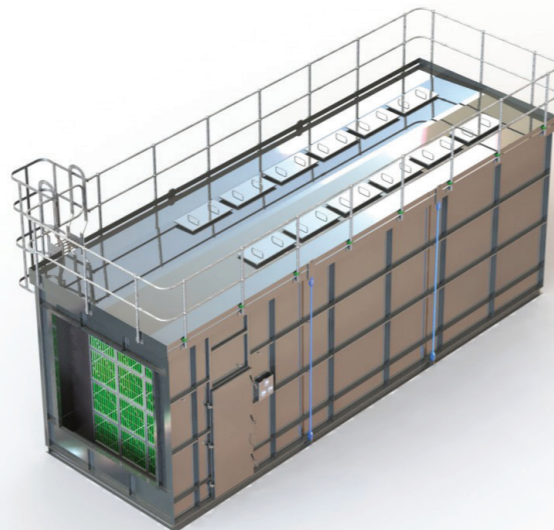
Notes:

- Rated airflow at 1 second contact time
- Overall approximate dimensions
- Filters 600 mm x 600 mm
- Estimated pressure drop across molecular filtration media LGS048 activated carbon
- Estimated maximum weight during use. Please refer to technical drawings for detailed information

PRE-FILTRATION

Pre-filtration is essential to protect the media bed from particles. Particles cause blocking of the media bed, increase pressure loss and ultimately restrict the exhaust airflow.

A VDBe can be fitted with 1 or 2 stages of pre-filtration, which are integrated inside the main filter body. The levels of prefiltration required are dependent on the condition of the airstream to be treated. The normal recommended minimum level of pre-filtration is F7 (EN779:2012)



MINIMAL LIFE CYCLE COST

It is a fact that the most cost efficient way to use any molecular filtration media is to provide the maximum possible contact time and ensure an even air velocity profile across all the media.

In reality, practical considerations such as physical size and cost serve to limit the achieved contact time. In designing the ProCarb VDBe series Camfil have

balanced an acceptably long contact time with an acceptable pressure loss value so that the associated exhaust fan will have the minimum possible kW rating, without any compromise on performance.

The layout of the media beds and the design pressure loss ensure even and very effective use of all of the filter

media. When media lifetime, service cost, downtime and energy costs are all taken into account, VDBe filters will return minimal LCC values.

DESCRIPTION

Camfil VDBe filters are robustly constructed to reflect the industrial environment where they are used. They will be installed in the exhaust air system and their construction is based on 3 mm thick carbon steel, fully welded with a 2 pack epoxy paint finish, suitable for an external environment.

The internal filtration media compartments will always be constructed from 316 grade stainless steel.

Media is loaded into the filter under gravity through top filling ports from a combination of 500kg super-sacks followed by 25kg sacks. Spent media can be removed by vacuum through the filling ports. This ensures the process is as safe and clean as possible for operatives and the local environment.

Pre-filters are fitted within the housing upstream of the molecular media beds to offer protection of the media beds from particulate, which could ultimately degrade the performance of the carbon bed. The particle filters are accessed through service doors on the side of the housing.

Pre-filters are held in the frame work by a robust clamping mechanism. This ensures elimination of internal leaks. Optional differential pressure loss gauges will be mounted on the side of the housing.

The filters are provided with external inlet and outlet flanges to facilitate connection of ductwork using industry standard connections.

SERVICING

VDBe filters are passive in operation and require very little routine maintenance. The pre-filters will have to be replaced when their differential pressure drop has reached the upper limiting value.

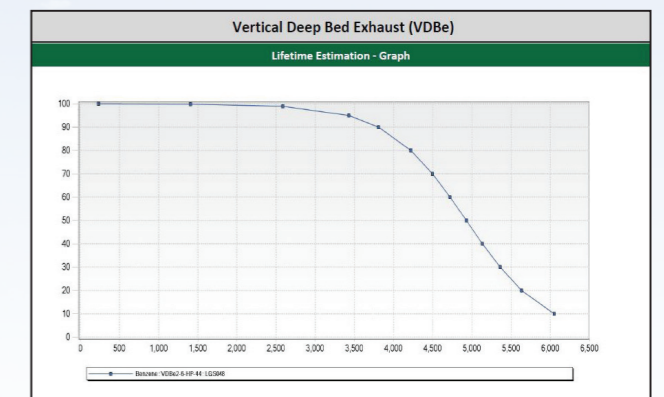
A hinged side door(s) provides access to the pre-filter chamber for service purposes. The used filters are simply unclipped from their holding frames, placed in plastic bags prior to disposal and replaced with new items.

The molecular filtration media will also need to be replaced when it is exhausted. The used media is removed from the filter via the lift-off ports on the top, using a vacuum process.

Waste media must be disposed of according to all applicable regulations; local and national. It is a feature of the Camfil VDBe filters that the compartments in the media bed have the same volume as the super-sacks used to deliver the media to site (1m³). This means that filling the media bed from super-sacks is an extremely quick, clean and convenient procedure.

In summary, the super-sacks are suspended above the top filling ports, the bottom discharge chute on the sack is opened by releasing the draw-cord and the media empties by gravity directly into the media bed in a very short time.

Vertical Deep Bed Exhaust (VDBe)			
Solution			
Filter Group :	ProCarb	Efficiency, [%]	LifeTime, [Hours]
Filter Type :	VDBe2-6-HP-44	99.99	233.00
Media :	LGS048	99.9	1,407.00
No of filters per stage :	1 (Total filters : 1)	99	2,585.00
Total Filter Stage :	1	95	3,426.00
Eff. Media Weight, [kg] :	6,297.5 [±10%]	90	3,907.00
Total Weight, [kg] :	15,903.5 [±7%]	80	4,220.00
Front Velocity, [m/s] :	0.08	70	4,495.00
Pressure Drop, [Pa] :	18 [±15%]	60	4,720.00
Contact Time, [sec] :	13.07	50	4,927.00
		40	5,133.00
		30	5,359.00
		20	5,633.00
		10	6,047.00



SPECIALISED SOFTWARE

The lifetime of a VDBe filter can be to ' The lifetime of a VDBe filter can be simulated using the unique Camfil Carbon Lifetime Determination (CLD) software for molecular filtration.

The purpose of this software is to provide "best estimates" of the performance of molecular filtration products under selectable conditions that approximate real applications. Predicting the performance of molecular filters in the real world is a complex issue. This software takes account of the key

factors that affect the performance of molecular filters; the gas/vapour to be controlled, concentration, type of adsorbent, amount of adsorbent (contact time), and temperature.

The software has been developed using adsorption theory, many years application knowledge, field measurements and results of extensive product testing in Camfil's unique molecular filtration test rig.

Camfil – a global leader in air filters and clean air solutions

For more than half a century, Camfil has been helping people breathe cleaner air. As a leading manufacturer of premium clean air solutions, we provide commercial and industrial systems for air filtration and air pollution control that improve worker and equipment productivity, minimize energy use, and benefit human health and the environment.

We firmly believe that the best solutions for our customers are the best solutions for our planet, too. That's why every step of the way – from design to delivery and across the product life cycle – we consider the impact of what we do on people and on the world around us. Through a fresh approach to problem-solving, innovative design, precise process control and a strong customer focus we aim to conserve more, use less and find better ways – so we can all breathe easier.

The Camfil Group is headquartered in Stockholm, Sweden, and has 30 manufacturing sites, six R&D centres, local sales offices in 30 countries, and 4,500 employees and growing. We proudly serve and support customers in a wide variety of industries and in communities across the world. To discover how Camfil can help you to protect people, processes and the environment.

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