



VaporGuard Activated Carbon Filter Use Protocol

VaporGuard (VG) activated charcoal filters work effectively only when they are used according to this SOP:

1. Weigh every **VG** canister **prior** to use.
2. Record the weight on the **VG** canister on the top charting line with the date.
3. Re-weigh the **VG** canister **before every use** and record those weights and dates.
4. When the recorded weight has gained 50grams above the initial weight, dispose of the filter properly and replace with a new one.

Activated carbon adsorbs ~25% of its own weight. Once it has adsorbed that amount, it allows the isoflurane to pass right through and escape into the procedure atmosphere. Each VaporGuard canister is supplied to you with a minimum of 200 g of activated carbon. Once your canister exceeds a weight increase of 50g, isoflurane may begin to escape the canister.

Saturated VaporGuard canisters when used with Isoflurane are not considered "hazardous waste" by EPA. However, some EH&S departments choose to treat them as hazardous waste. When using the canisters with Sevoflurane, there may be a chloroform component of the agent that would dictate that they **should** be handled as hazardous waste. Ask your facility EH&S how you should dispose of the canisters.

VaporGuard canisters can be used with equal efficiency in any position, lying, standing, upside down or suspended.

VaporGuard canisters have a shelf life in excess of 5 years if they are stored in a temperature and humidity controlled area. In extremely humid climates they should be stored in sealed plastic bags or other containers.

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Breakthrough of Waste Isoflurane Emissions Varies Among Canister Brands and Between Canisters

Data taken from Smith and Bolon
(Contemporary Topics in Laboratory Animal Science 42 (2) 10-15, March, 2003)
and presented here with written permission from Contemporary Topics in Laboratory Animal Science.

Canister Type	Charcoal Canister No. ¹	Canister Weight Change at initial Breakthrough ²	Percent of Maximal Use-Life ³	Isoflurane Level (ppm) at Breakthrough	Canister Weight Change at Peak Isoflurane Emission	Peak Isoflurane Emissions (ppm) ⁴
BF (BreathFresh)	1	4	4	2.0	39	11.5
BF (BreathFresh)	2	17	34	4.1	44	33.5
BF (BreathFresh)	3	9	18	31.4	28	52.8
BF (BreathFresh)	4	5	10	4.1	13	29.0
BF (BreathFresh)	5	7	14	3.6	32	17.5
BF (BreathFresh)	6	11	22	15.3	49	66.2
ENV (Enviropure)	1	54	108	2.1	31	0.6
ENV (Enviropure)	2	21	42	1.7	7	1.7
ENV (Enviropure)	3	N/A	-	0	44	1.0
ENV (Enviropure)	4	24	48	1.7	24	1.7
ENV (Enviropure)	5	2	4	4.8	2	4.8
ENV (Enviropure)	6	2	4	1.9	48	3.2
FA (F/Air)	1	9	18	2.9	48	33.0
FA (F/Air)	2	5	10	6.0	46	>100
FA (F/Air)	3	7	14	1.6	37	12.6
FA (F/Air)	4	7	14	4.0	50	37.4
FA (F/Air)	5	8	16	25.9	34	62.8
FA (F/Air)	6	10	20	5.6	39	54.4
VE (VetEquip)	1	N/A	-	0	N/A	0
VE (VetEquip)	2	N/A	-	0	44.6	0.2
VE (VetEquip)	3	N/A	-	0	N/A	0
VE (VetEquip)	4	N/A	-	0	40	0.1
VE (VetEquip)	5	N/A	-	0	43.5	0.1
VE (VetEquip)	6	N/A	-	0	35.7	0.2

Notes: Canisters were attached to the non-rebreathing circuit with the stopcock to the induction box closed during spectrophotometry testing; Canister weights are shown in grams.

¹ Data for BF (Breath Fresh, Jorgensen Laboratories, Loveland, CO), ENV (Enviropure, SurgiVet Inc., Waukesha, WI), and FA (F-Air, A.M. Bickford, Wales Center, NY), were published previously in Smith and Bolon (Contemporary Topics in Laboratory Animal Science 42 (2) 10-15, March, 2003). The VE (Vet Equip, Pleasanton, CA) data was acquired in a subsequent study. Data for all canister types was collected in a uniform manner (2% Isoflurane carried in 1 L/minute oxygen), with standard equipment and use practices.

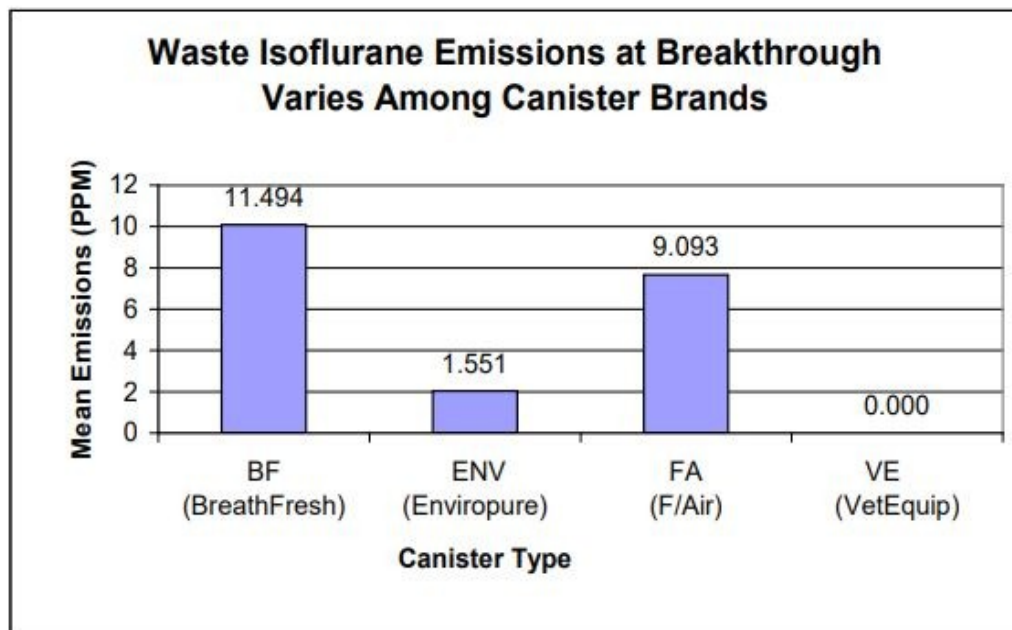
² Initial breakthrough denotes emission of isoflurane levels of at least 2 ppm.

³ Maximal use-life (as defined by the manufacturer's specifications) is a weight change of 50 grams from the baseline canister weight.

⁴ Peak emission denotes the highest reading during the course of each canister's rated use life (i.e., weight change of 50 grams).

VaporGuard **Activated Charcoal Filters**

Many facilities voiced concern after a March 2002 Contemporary Topics article discussed activated carbon (charcoal) canisters and their failure rate when used to trap anesthetic waste gas. One of the three canisters carefully tested was a brand we were selling at that time. As a result of the study, we began designing a new canister that might not have the same issues as the three brands then commercially available. After nearly one year of R&D, we sent our working prototype to the study authors who kindly agreed to reproduce their initial study, using our VaporGuard prototype. The results were very positive and we have printed them here for your review and convenience.



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