



Transform Compost Systems

turning waste into an opportunity

October 30, 2020

Technical Memorandum – Hi Point Agro Bedding Recycling Process Odor Management Building 1

Summary

The potential odor from the incoming animal manure and bedding to the HiPoint Recycling Facility will be successfully managed by fully enclosing and negatively ventilating the building, with all of the exhaust air scrubbed with a carbon filter.

Introduction

HiPoint Agro Bedding recycles animal bedding mixed with manure to produce clean bedding and soil enhancement products.

As an expert in organic waste management and odor control, I was requested to provide an opinion on how any potential odor from the manure input for the facility (identified as Building 1 within the red rectangle as shown in Figure 1 below) will be managed and design the system from past experiences.

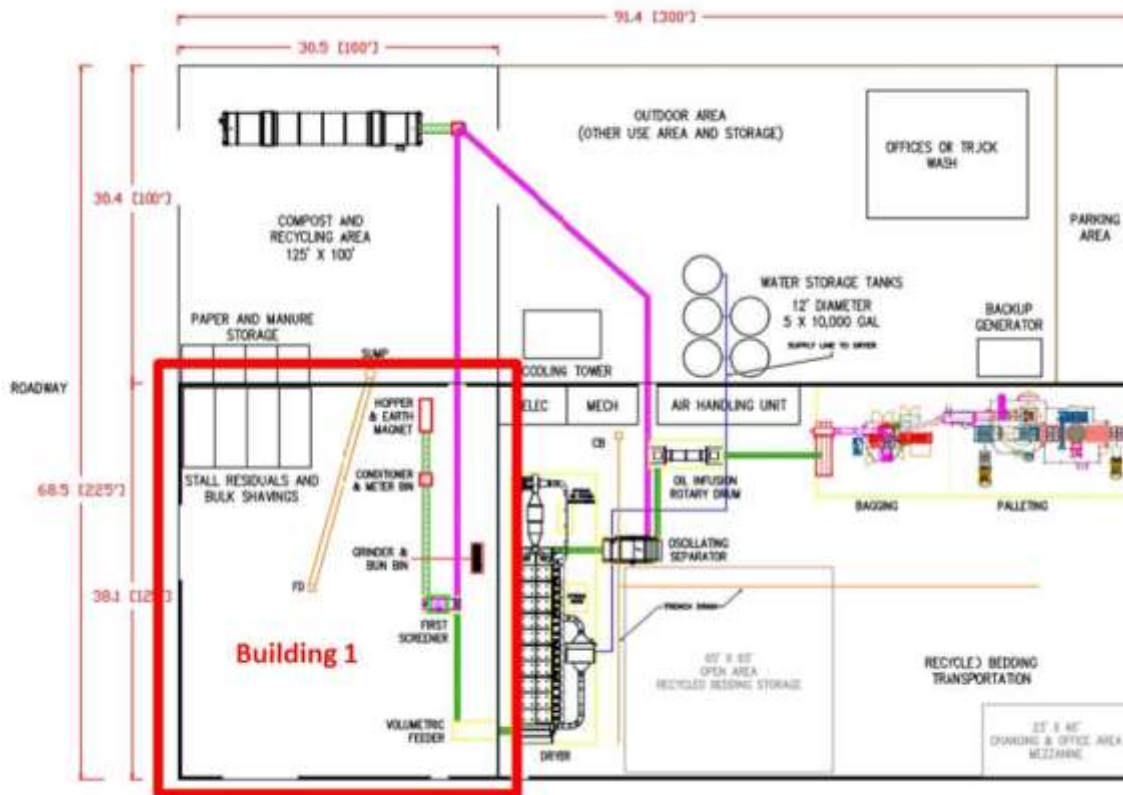


Figure 1. Plan view of the Hi Point Recycling Process with Building 1 identified within the red rectangle.

Size of the Building and the Manure Storage Capacity

The size of the area where the manure and bedding will be received measures 114 ft wide by 125 ft long, or 14,250 square feet. This building will house 5 receiving bays, each measuring 15 ft wide, 30 ft long filled to a depth of up to 10 ft. The total capacity of manure storage is 833 cubic yards, or 260 tons (assuming a bulk density of 3.2 cubic yards per ton).

Licensed manure haulers will deliver the manure from the farms directly to the manure storage bays inside enclosed Building 1 of the HiPoint Agro Bedding Facility.

Expected Odor from the Manure Being Received

Horse manure and bedding is not as odorous as some materials, such as food waste or biosolids. Horse manure consists of partially decomposed animal feed and bedding material which is not as saturated with moisture as food waste can be. It also does not have the same energy to become highly anaerobic and produce some of the characteristic putrid and rancid odors that we may experience with high moisture content food wastes.

With horse manure, we can expect increased odor from manure and bedding that is saturated with moisture or has a high proportion of manure relative to the wood shaving bedding.

Good storage bin design and good housekeeping is important to reduce the potential for odor. The storage bays are designed for easy cleanout so that excess moisture will not accumulate. The multiple bays also ensure that the bays can be completely emptied, allowing the manure to cycle efficiently through the process.

Odour Control Options for Building 1

The best available odor control technology for the manure in this building will include a negatively ventilated building with up to 3 air exchanges per hour, an air extraction system discharging the air from the building through a carbon filter before releasing the air outside the building.

Carbon filters are used successfully at wastewater facilities to minimize odor emission. We expect lower odor concentrations and similar air moisture contents at the manure processing facility.

The volume of the building is 114 ft x 125 ft and estimated to be 20 ft high for a total volume of 285,000 cubic feet. At 3 air exchanges, the exhaust requirement is 14,250 CFM, which will be extracted from the building through a 36" diameter duct and an axial blower, which then pushes the air through a carbon filter before it is released outside the building.

To maintain the negative ventilation inside the building, the overhead doors will be closed at all times except when a truck is delivering manure. An air curtain on top of the doors ensures minimal escape of duct and odor when the doors are open.

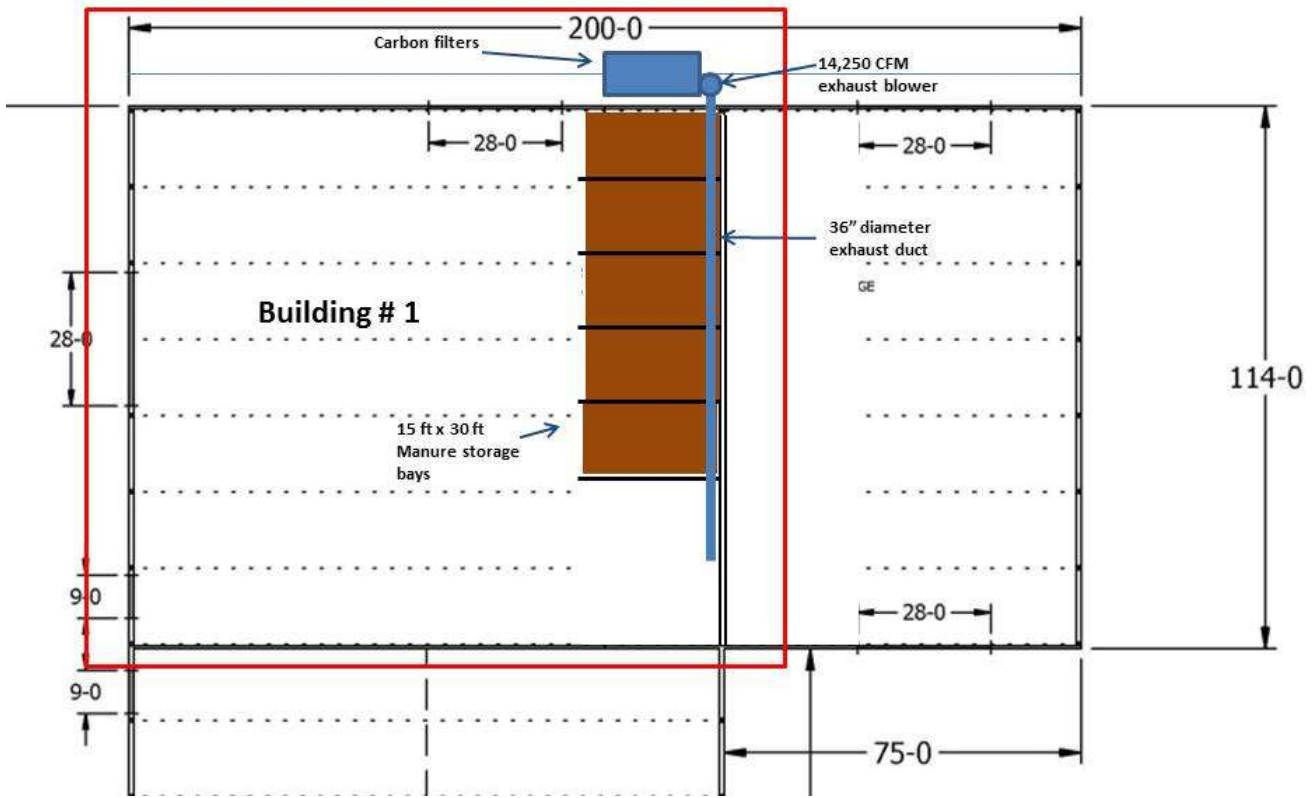


Figure 2. Plan view of building 1 showing the manure storage bays, the 36" duct, blower and carbon filter to mitigate odor.



Figure 3. Photo of a carbon filter at a wastewater treatment facility

This report has been prepared by John Paul, Ph.D, P.Ag



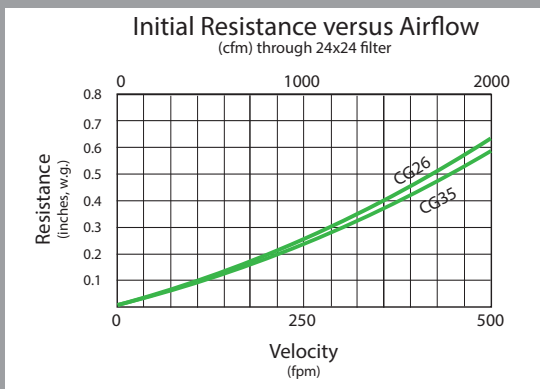
10", 18" and 24" lengths shown. 10" (reduced capacity) only available by special order, contact factory.

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Refillable high capacity molecular cylinders remove offensive gaseous contaminants or reduce expenses associated with ventilation air.

Camfil CamCarb CG filters are plastic cylindrical molecular filters. The filters are used for high efficiency removal of molecular contaminants from supply air, recirculation air and exhaust air ventilation systems in sensitive buildings and process applications. Service life 1 to 3 years or more



NO_x, VOCs, SO₂, polyaromatic hydrocarbons -PAH)

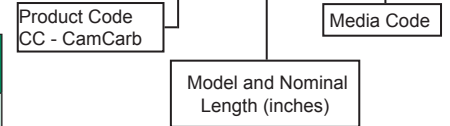
CamCarb CG cylinders are excellent for the removal of ozone (O₃), automobile fumes and diesel engine exhaust (SO_x, NO_x, H₂S, VOCs), jet engine fumes in airports (SO_x, NO_x, H₂S, VOCs) and light levels of industrial emissions (acid gases, NH₃, solvents).

Performance Data

Canister Model	Diameter & Length (inches)	Bed Depth (inches)	Maximum Air Flow	Nominal Resistance Maximum cfm (inches w.g.)	Molecular Volume (cu. ft.)	Carbon Mass (lbs) ¹	Typical Mass per 24" x 24" Opening (lbs)	Ozone Removal Rating	Residence Time @ Maximum Air Flow
CG26	5.7 x 18	1.0	2000	0.63	0.15	4.5	72	Oz 9	0.07
CG35	5.7 x 23- ¹ / ₄	1.0	2000	0.59	0.20	6.0	96	Oz 9	0.094
CG10	5.7 x 10	1.0	1000	0.35	0.08	2.4	38	Oz 9	0.074

¹ Based upon CEX004 4mm pellet carbon.

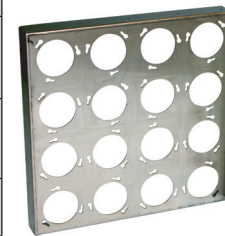
Model Designator CC-CG35-CEX004



Media Name	Media Code	Description	Typical Applications
LGX048	LGX048	Granular activated carbon	New construction odors, VOCs, tobacco, ozone
CEX004	CEX004	Pelletized activated carbon	New construction odors, VOCs, tobacco, ozone
CEX004A3	CEX004A3	Pelletized activated carbon impregnated to target a range of acidic gases	Pulp & paper, sewerage treatment facilities, manufacturing & chemical processing
CamPure 4, 8, 9	CP4, CP8, CP9	Activated alumina impregnated with potassium permanganate	Indoor air quality, low molecular weight hydrocarbons, oxidizable acid gases
CamPure 44, 48, 84, & 88	CP44, CP48, CP84, & CP88	CamPure media blended with pelletized activated carbon	Airports, pharmaceutical make-up air, funeral & nursing homes, animal care facilities, make-up air
CamPure 10	CP10	Activated alumina impregnated with sodium permanganate	Pulp & paper, sewerage treatment facilities, manufacturing & chemical processing, and acidic sulfur gases
CamPure 15	CP15	Activated alumina and activated carbon powders impregnated to target a range of acidic gases	Pulp & paper, sewerage treatment facilities, manufacturing & chemical processing, and acidic sulfur gases
Other media available. Contact factory for details.			



Camfil CG Cylinders include stainless steel bayonet stubs that twist on to Camfil CamCarb holding frames. Each cylinder is easily removed from holding frame with a 24mm wrench.



CamCarb CG cylinders are designed to attach to Camfil CamCarb holding frames. Built-up bank and side-access housing versions are available. Image shows a 24" x 24" frame.

DATA NOTES:

Please contact factory for assistance in selecting the optimum molecular removal media for your application. Operating temperature limitation is 105° F (41° C). Not for installation in condensing environments or applications where entrained moisture is present.

Specification

1.0 General

- 1.1 - Cylinders shall be a combination of PP copolymer and ABS plastic refillable loose-fill molecular media cylinders to be installed on matching holding frames.
- 1.2 - Sizes shall be as noted on enclosed drawings or other supporting materials.

2.0 Construction

- 2.1 - Molecular media cylinders shall be constructed of high impact ABS plastic and shall be enclosed with a plastic end cap. The cap shall be disposable and replaced during every molecular media replacement interval.
- 2.2 - The air inlet of the cylinder shall be conical in shape to facilitate uniform airflow across the entire surface of the molecular media.
- 2.3 - Each cylinder shall include a minimum of 4.2 slots per square inch of cylinder surface area each slot measuring 32 mm long by 2.3 mm wide. There shall be a minimum of 200 slots per 2" of cylinder length.
- 2.4 - Each cylinder shall include a mounting assembly with three integral stainless steel bayonet stubs for mounting to matching cylinder mounting flange.
- 2.5 - Each cylinder shall contain at least 1.5 pounds of molecular media per 6" of cylinder length.
- 2.6 - Molecular media shall be Camfil (*select one of the following):
CEX004, activated carbon, with a minimum activity rating of 60% on carbon tetrachloride.
CEX004A3, impregnated carbon for adsorption of corrosive and acidic gases.
CP4, activated alumina impregnated with potassium permanganate.

- CP44, blended activated carbon and activated alumina impregnated with potassium permanganate.
- CP9, activated alumina impregnated with 6% potassium permanganate and other impregnations.
- CP94, blended carbon and CP9.

3.0 Performance

- 3.1 - System pressure drop shall not exceed (0.50, 0.63)" w.g. at a velocity of 500 fpm, with 4mm mesh activated carbon when mounted to matching cylinder holding frame(s).
- 3.2 - Cylinder to mounting hardware procedure shall form a mechanical connection with a seal limiting air bypass across canister mounting assembly.
- 3.3 - Manufacturer shall provide evidence of facility certification to ISO 9001:2008.
* Items in parentheses () require selection.

4.0 Performance Testing

- 4.1 - Manufacturer shall provide results of efficiency testing against nitrogen dioxide, ozone, and toluene.
- 4.2 - Test to be conducted on full size complete filters when challenged with typical ambient concentrations, i.e. 1 to 5 ppm at 2,000 cfm.
- 4.3 - Gas detectors must have lower level of detection (LLoD) values <1 ppb.
- 4.4 - Filters to be tested by the manufacturer using a protocol in accordance with ASHRAE 145.2. Full details of test protocol to be included with photographic evidence.

For detailed specifications please consult your local Camfil Distributor, Representative, or www.camfil.com. Camfil has a policy of uninterrupted research, development and product improvement. We reserve the right to change designs and specifications without notice.



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