ATTACHMENT 7: UPDATED ODOR ABATEMENT PLAN, DATED JANUARY 17, 2022

Cannabis Odor Abatement Plan

Processing/Warehouse

(UPDATED)

January 17, 2022

Prepared for:
Magu Farms, LLC G&K
Graham Farrar; Padaro Glass House
Warehouse/Processing Building

Site Address: 3561 Foothill Rd
Carpinteria, CA 93013

Prepared by:
Nate Seward, PE, CIH
Professional Mechanical Engineer (M31978)
Certified Industrial Hygienist (9582 CP)
Certified Radon Tester #108180RT
EPA & IICRC Instructor (WRT & AMRT)
Licensed Asbestos Abatement Consultant (I-1923)

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Magu Farms, LLC – G&K
Warehouse/Processing Building
Site Address: 3561 Foothill Rd
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Re: Cannabis Odor Abatement Plan (OAP)

1.0 Compliance with Standards

This Cannabis Odor Abatement Plan has been prepared to comply with the Santa Barbara County Coastal Zoning Ordinance requirements and the regulations set forth for Commercial Cannabis regulations. The objective is to eliminate odors from reaching receptors within residential zoned properties closest to the subject site. On behalf of Magu Farms, LLC - G&K Farms (Operator), this Odor Abatement Plan (Plan) has been prepared for the Warehouse/Processing Building in compliance with the Santa Barbara County Coastal Zoning Ordinance, Section 35-144U, Cannabis Regulations, for the purposes of minimizing nuisance odors related to the cultivation of commercial cannabis at 3561 Foothill Road, Carpinteria, CA 93013 (Site/Property). This plan will be used in conjunction with the existing OAP for 18CDP-77 which applies to the adjacent greenhouses on the same property. This plan includes the evaluation of the following:

1. Odor emitting activities;
2. Surrounding land uses including proximity to residentially zoned areas;
3. Site specific installation of the proposed odor abatement system;
4. Technology effectiveness in reducing and/or eliminating cannabis-related odors; and
5. Other options for best available odor control technologies and an analysis of systems available;

2.0 Site Description

The project is a new 25,054 SF (gross) single level agricultural accessory warehouse to be used for storage, drying, trimming and processing of cut cannabis flowers. The processing building will contain active carbon/charcoal filtration systems for odor control. The proposed odor abatement system will be operational 24 hours per day, 365 days of the year. The 14.66-acre property is located at 3561 Foothill Road in Carpinteria and is zoned AG-I-10. The proposed processing warehouse is located on the southeast side of the property. See Figure 1

3.0 Description of Odor Emitting Activities and Phases

Odor-emitting activities includes drying, bucking, curing, grading, trimming, storing, packaging, and labeling of cannabis products. Processing activities generate the strongest odor emissions. Plants are typically undergoing processing for 4 weeks total. At harvest, plants are cut down and quickly transferred from the adjacent greenhouses to the processing area to be dried. The drying process can take one (1) to two (2) weeks. From there, the dried plants are bucked off their stems and trimmed into their final form, which takes one (1) day. They are moved to the curing room within airtight bins, for approximately one (1) to two (2) weeks and then packaged up for wholesale. Once the flower enters airtight bins and sealed final packaging containers, the odors are effectively contained.

4.0 Charcoal/Carbon Filters

Odors from the proposed warehouse will be controlled and mitigated by the use of carbon filtration units inside the warehouse. Additional engineering controls will be established to supplement the odor abatement including air curtains located at each exterior door in the processing area coupled with a negative pressure design. The processing area has two active carbon filtration systems at work, one that is internal to the HVAC system, which is conditioning and recirculation the air inside the building for the inhabitants and a separate system that is sending it through an active carbon deodorization filtration system and then exhausting the air from each space to the exterior. See attached Plan Set.

Carbon/Charcoal filters have been successfully used for decades in controlling odorous

compounds in a variety of industries, including the cannabis industry. Carbon filters (activated carbon) are manufactured to have an enormous surface area which allows for effective adsorption of odorous chemicals/molecules on to the carbon. Carbon filtration has been recognized as a best available technology to mitigate odors and is listed in the Final Environmental Impact Report.

Carbon filtration is more effective in enclosed structures which will be the case for this project. They are most effective when used in conjunction with an inline fan to pull the air through the filter and allow contact time with the odorous molecule and activated carbon or charcoal. Odor reduction is only achieved if the air moves through the carbon filtration mechanism.

The applicant is planning on utilizing CamFilters (See Attachment 1 for Specification) inside the processing drying rooms.

"Processing Drying Rooms" (Rooms #1 - 8) will each have a single 4,000 CFM Camfilter Carbon Filtration Unit.

Processing Rooms (Rooms #1 – 4), the Distribution/Storage Room and Office 5 will contain a fan coil with carbon filtration.

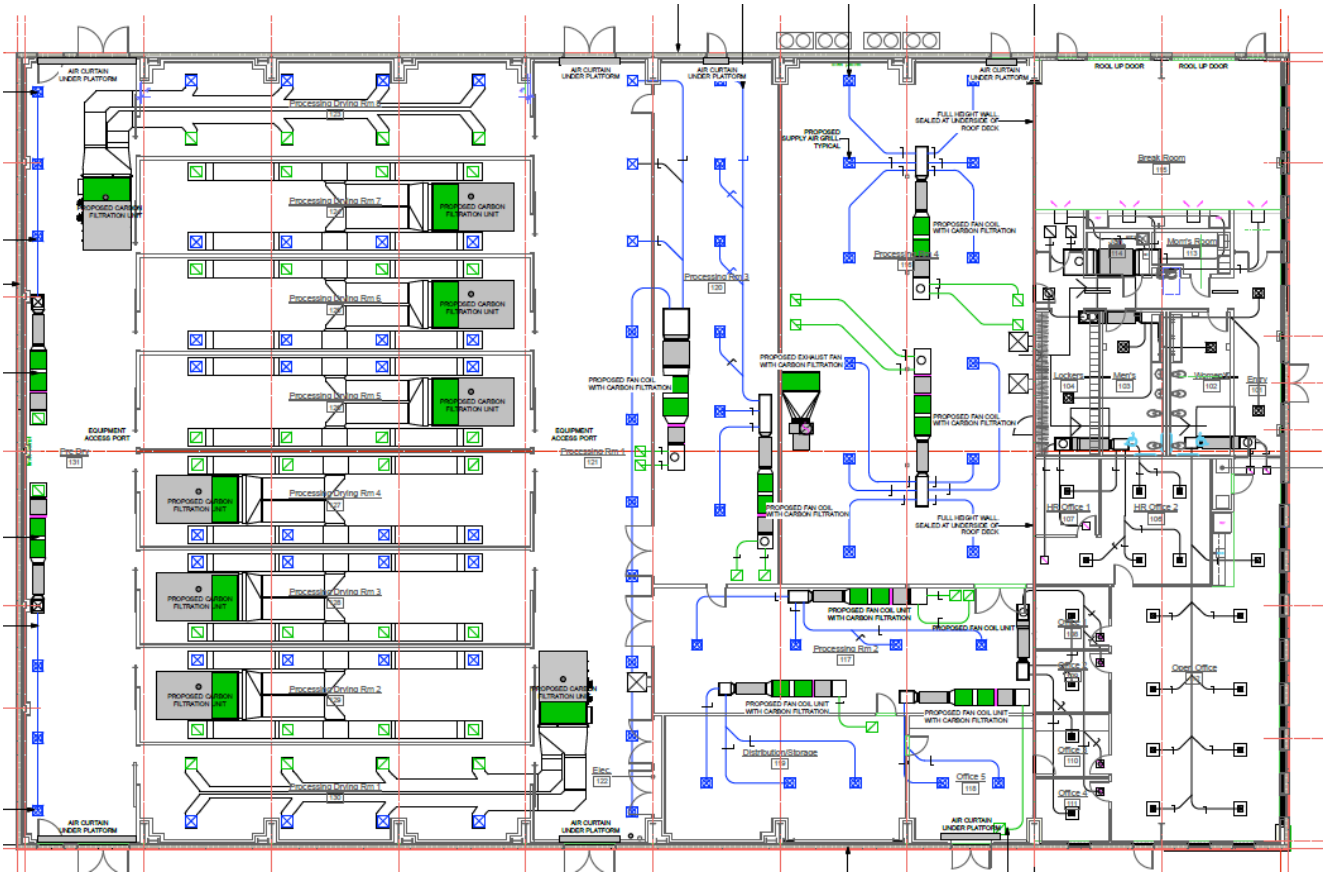


Figure 2: Carbon Filtration Design

The dilution formula that will be used to determine the number of carbon filters will be:

$$\text{Cubic Feet/Min (needed)} = \frac{\text{Room Volume x Air Changes/hour}}{60}$$

Air Changes/hour = 4

Dimensions of rooms that will utilize carbon filters:

Processing Drying Rooms (quantity 8 processing drying); 860sf with 12' ceiling = 10,320ft^3 each
CFM needed = (10,320 x 4) ÷ 60 = 688 cfm/room
688cfm/room x 4 rooms = 2,752cfm needed; Therefore utilizing a 4,000cfm machine will be more than sufficient to filter 4 processing drying rooms with 1 machine.

Processing Room #1; 2,534sf with 10' ceiling = 25,340ft^3
CFM needed = (25,340 x 4) ÷ 60 = 1,689 cfm
Number of filters = 1,689 ÷ 4,000 = 1 Machine

Processing Room #2; 1,207sf with 10' ceiling = 12,070ft^3
CFM needed = (12,070 x 4) ÷ 60 = 804cfm
Number of filters = 804 ÷ 4,000 = 1 machine

Processing Room #3; 1,677sf with 10' ceiling = 16,770ft^3
CFM needed = (16,770 x 4) ÷ 60 = 1,118cfm
Number of filters = 1,118 ÷ 4,000 = 1 machine

Processing Room #4; 3,355sf with 10' ceiling = 33,550ft^3
CFM needed = (33,550 x 4) ÷ 60 = 2,236cfm
Number of filters = 2,236 ÷ 4,000 = 1 machine

These calculations dictate the amount of equipment based on 4 air changes per hour, which is more than the required air changes per hour by the County Building and Safety Dept. Additional carbon filters can be added if additional odor reduction is desired.

Carbon Filtration Maintenance: Upon initial operation of the proposed carbon filtration system, the manufacturer has established an evaluation of process for determining appropriate carbon replacement intervals. After several weeks of initial use, the first set of carbon filters will be removed and sent back to Camfil for analysis. Based on the carbon absorption rate, Camfil calculates a filter replacement schedule specific to the facility to ensure the carbon

exchanges occur often enough to prevent carbon breakthrough.

Design: The proposed warehouse has been intentionally designed to minimize opportunities for untreated fugitive odors to escape. The project has been redesigned to eliminate four (4) roll-up doors. The current project design only incudes two (2) roll-up doors, which are located in the break room area. This area is separated from the processing space (most odiferous area) by a full height, sealed wall. In other words, this design eliminates the possibility that odors from the processing room will escape the building through the roll up door.

Air curtains: All nine (9) exterior man doors (that lead into the processing area of the warehouse) are equipped with an "air curtain" that automatically blows a brisk blast of air down the inside face of an opening when the doors open, working in conjunction with the negative pressure of the mechanical design in preventing odors from escaping the building.

Spray insulation: The interior face of the building envelope will be insulated and sealed with a continuous spray foam insulation on the walls and under roof, which is a best practice to control odors. The spray foam insulation will tighten the building envelope, and assist in making the negative pressure design more efficient and has been proven to prevent fugitive odors from escaping.

Negative Pressure: The proposed warehouse/processing building will be equipped with carbon adsorption equipment specific to the relative odor in each portion of the structure. The project design of HVAC and carbon systems is custom to the facility. Rooms expected to have higher odor concentrations, such as the dry-bucking and machine trimming rooms will have a more robust ability to produce negative pressure and achieve air exchanges in regular intervals. Four (4) processing rooms, distribution office, the vault, 8 processing drying rooms, the pre-dry room room will be designed to achieve negative pressure.

Processing Rooms 1-4, the distribution/storage room, and the distribution office are proposed to include a fan coil with carbon filtration. Given the size of these rooms, as well as the proposed number, size and type of filters are more than adequate to mitigate odors. In addition to the designed HVAC system that will include carbon filtration, these odiferous areas will also include a separate carbon filter unit that will exhaust out of the space at a higher volumetric flowrate than what is being supplied to the space from the HVAC system, thus creating negative pressure. This design is allowing these areas to be treated twice with carbon filtration equipment prior to being exhausted out of the building. Therefore, the air will be scrubbed several times. The remaining portions of the structure where cannabis is not as odiferous, such as unloading areas for wet flower in sealed totes (Pre-Dry) or final packaged areas (Vault), will be carbon scrubbed as well, although negative pressure would be lower. If necessary, air curtains can be added to supplement fugitive odor release at vehicle loading/unloading doors.

Residential Zones

The subject site is located on a property zoned AG-1-10. Existing and historic uses on the property include the cultivation of cut flowers. To the north, east, west and south are existing agricultural properties. The nearest residentially zoned parcels are located to the south over 1,000 feet from the subject site.

Figure 3: Nearest Residential Zone

5.0 Model OAP and Odor Complaint Tracking System

In the event of an odor complaint at the Property, please contact the Operator's Primary Odor Contact, as well as the Planning & Development Department (Department) at (805) 568-2057 or online at https://www.surveymonkey.com/r/cannabis_complaints

Primary Odor Contact: Philip van Spronsen; Philip@glasshousefarms.org

1. Weather Monitoring

A. Operator shall install and maintain continuous weather monitoring equipment in accordance with direction of a meteorological monitoring network plan provided by a qualified third-party professional so as to continuously record and transmit weather data, including wind speed, direction (including low speed wind direction capabilities), temperature and barometric pressure for as long as it engages in cannabis cultivation at this Property.

B. This weather data will be maintained electronically and made available upon request (for at least one year) to the Department.

C. Operator will use weather data to identify the variables and conditions that can cause, contribute to and affect Odor Episodes (defined below) and to better understand the transport and fate of odor emissions from cannabis operations in Carpinteria.

D. In the event that a regional meteorological network is created by the Department or other entity, data from Operator's weather monitoring equipment shall be made available in real time to such network.

2. Odor Technology

The facility shall follow all methods for controlling and reducing odor as outlined in this Odor Abatement Plan and shall deploy, or re-deploy the best available control technologies (BACT) or methods as necessary to control odor at the facility, as determined by the Department. Any BACT to be employed by an Operator at a future date may require additional permits or changes to existing permits as determined by the Department.

3. Initial Audit and Continuing Monitoring Obligations

The Operator shall develop a testing program to deploy continuously over a 7-day period

the best available proven odor monitoring device/method to measure cannabis odor causing emissions from the property during the first week of permitted operations, if other equivalent baseline odor testing has not already been conducted. The applicant shall maintain all odor monitoring data for 3 years and shall provide odor monitoring data to the Department upon request.

4. Community Participation and Outreach

Prior to the commencement of operations, the Operator shall provide to property owners and residents located within 1,000 feet of the Property the contact information for the Primary Odor Contact, who shall be available by telephone on a 24 hour/day basis to receive and respond to calls regarding any odor complaints (Santa Barbara County Article II Coastal Zoning Ordinance (CZO) §35-144U.C.6.f.1.). The Operator shall immediately notify the Department, property owners and residents located within 1,000 feet of any changes to the local contact (CZO §35-144U.C.6.f.2.).

5. Odor Response Protocol

The Operator will continuously monitor odor complaints and will immediately route complaints to the Primary Odor Contact for a timely response. The Operator may utilize analytical tools and measurement systems to evaluate odor inquiries and assess odor conditions, as well as for routine monitoring of horticultural conditions, for the long-term goal of eliminating fugitive cannabis odors.

The Operator shall notify the Department of any complaints the Operator receives within 24 hours of receiving the complaint (CZO §35-144U.C.6.f.3). The Operator shall respond to an initial complaint within one hour and if needed, take corrective action to address any violation of CZO §35-144U.C.6 within two hours (CZO §35-144U.C.6.f.4). The Operator shall implement a complaint tracking system for all complaints that the operator receives, which includes a method for recording the following information: contact information of the complainant (if the complainant is willing to provide), as well as a description of the location from which the complainant detected the odors; time that the operator received the complaint; description of the complaint; description of the activities occurring on site when the complainant detected the odors; and actions the operator implemented in order to address the odor complaint. The operator shall provide the complaint tracking system records to the Department as part of any Departmental inspections of the cannabis activity, and upon the Department's request. The operator shall maintain the complaint tracking records for a minimum of five years (CZO §35-144U.C.6.f.5).

If the Department receives three verified complaints regarding odor events in any 365-day period, the Operator shall implement corrective actions to comply with the odor abatement requirements of County Code Section §35-144U.C.

a. Level 1 Response - Initial Assessment and Corrective Actions

For any instance in the Odor Response Protocol below where the Operator can determine that an odor complaint is "resolved" or "unresolved", the determination by the

Operator does not preclude the Department from taking further actions, including enforcement actions pursuant to Section 35-185 (Enforcement and Penalties), of the Coastal Zoning Ordinance, which may include, but are not limited to, initiating proceedings to revoke the applicable cannabis land use entitlement(s) pursuant to Section 35-169.8 (Coastal Development Permits) of the Coastal Zoning Ordinance.

Once an odor complaint is received by the Operator, the Operator shall within one hour after the odor complaint is received, perform an onsite visual inspection to ensure the function and integrity of the following:

1. The odor abatement equipment is working as intended and that there are no visible breaks or blockages in any odor abatement equipment; and
2. If being used, all carbon scrubbers or other odor abatement equipment are working properly and filters are clear of any debris; and
3. All doors are closed, sealed and secured, including greenhouse entry and exit points, internal processing rooms and processing entry and exit points, pursuant to Operator's Standard Operating Procedures ("SOPs"); and
4. A walk of the perimeter of the cannabis facilities, inspecting the integrity of the walls and structure and examining if a physically apparent source of odor can be detected.

If a cause for the reported odor episode was discovered during the inspection, the Operator shall take corrective action to address any violation of CZO §35-144U.C.6 within two hours of the complaint.

After taking corrective action, the Operator shall complete a site inspection at the reported odor complaint location to determine whether the odor complaint has abated. If odor is no longer detectable at the reporting location identified in the complaint or at locations in the direction where the Operator would expect odor to migrate based on the meteorological conditions present at the time of the odor complaint, then the odor complaint may be deemed resolved.

If no cause for the reported odor complaint was ascertained during the inspection and if odor is not detectible at the reporting location identified in the complaint, the odor complaint shall be deemed resolved.

b. Level 2 Response -- Diagnostic Assessment and Corrective Actions

If, after the Level 1 Response is complete, the Operator continues to observe fugitive odors, receives further odor complaints indicating that the odor is persisting or recurring periodically during the following 8-24 hour period, the Operator shall:

1. Conduct a weather assessment (wind speed, direction and any shifts, anecdotal weather information collected from interested parties, time and

duration of odor complaint) of the conditions that were occurring at and in the two hours before the time of the odor complaint;
2. Perform a comprehensive diagnostic review of the odor abatement system;
3. Interview staff members that were on site during and in the two hours before the time of the odor complaint and determine if they performed or observed any actions or circumstances that may have caused or contributed to the reported odor complaint and evaluate if the operation adhered to the Operator's SOPs for odor abatement;
4. Repair or correct any conditions discovered that may cause or contribute to the odor complaint.

If a cause for the reported odor complaint is identified, the Operator shall take corrective actions, revise its SOPs, and/or adjust the odor control systems as necessary to address the condition(s) that caused the odor complaint. The Operator shall obtain any applicable permits related to project changes resulting from corrective actions before implementing any new odor abatement equipment that is not identified in the OAP. The Operator shall report the conclusions of its investigations (excluding any bona-fide proprietary or trade secret information) to the Department. Once these steps are completed, the odor complaint shall be deemed resolved.

If no cause for the reported odor complaint was ascertained during diagnostic assessment, and if the known reporting location is confirmed to be odor-free, the Operator shall prepare a written report (excluding any bona-fide proprietary or trade secret information) summarizing the Level 2 Response and submit it to the Department.

c. Level 3 Response -- Analytical Assessment and Corrective Actions

If, after the Level 2 Response is complete, the Operator continues to observe fugitive odors and/or receives further odor complaints during the following 8-24 hour period, or the reporting party responds that odor is persisting or recurring periodically during the following 8-24 hour period, the Operator shall implement further corrective actions as follows:

1. Commission a Professional Engineer (PE) or a Certified Industrial Hygienist (CIH) to perform an on-site evaluation of odor levels to analyze whether the Operator is the source of the reported odor complaint. The Operator's PE or CIH will use the Operator's and any other available meteorological data and the Operator's knowledge of operational activities at the time specified in the odor complaint to investigate the odor complaint, as feasible.
2. If no further conclusions are found from the analysis, and the Operator is unable to identify the potential cause of the odor complaint, the odor complaint is unresolved.
3. In the event that an odor complaint is unresolved and is recurring or continuing, as evidenced by repeated odor complaints from the property, the Operator shall:

i. Commission a Professional Engineer or a Certified Industrial Hygienist to implement a testing protocol to measure odor or an odor-causing constituent using the best, currently available objective, odor measurement device, technology or methods.
ii. Undertake corrective actions identified by the PE or a CH including, but not limited to:
    1. Revise its SOPs.
    2. Adjust or improve the function of the existing odor control systems (e.g., adjust dispersal of neutralizers, replace spent carbon media, install self-closing doors).
    3. Install supplemental or replacement odor control technologies, such as but not limited to internal greenhouse scrubbing systems. Such technology could potentially include installation of 5-15 Regenerative Carbon Scrubbing units per acre of adult-flowering cultivation (exact system design to be defined on a Project specific basis as determined by a qualified professional).Depending on the scope and nature of the supplemental or replacement odor control technologies, additional permitting may be required by the Department and, if required, must be obtained before installing the technology.

If a cause for the reported odor complaint is identified, the Operator shall take corrective actions as recommended by the PE or CIH as necessary to address the condition(s) that resulted in the odor complaint. The Operator shall obtain any applicable permits related to project changes resulting from corrective actions before implementing any new odor abatement equipment that is not identified above in the OAP. The Operator shall report the conclusions of its investigations (excluding any bona-fide proprietary or trade secret information) to the Department. Once these steps are completed, and the odor is not detectable at the reporting location, the odor complaint shall be deemed resolved.

If no cause for the reported odor complaint was ascertained during diagnostic assessment, and if the odor is not detectable at the reporting location, the Operator shall prepare a written report (excluding any bona-fide proprietary or trade secret information) summarizing the Level 3 Response and submit it to the Department.

If after the PE or CIH Analysis has been completed, the Operator believes it is not the sole or a contributing source of the reported odor complaint, the Operator shall notify the Department of its conclusion, within three (3) calendar days of reaching such conclusion. The Department will consider this information in determining whether corrective actions are necessary to comply with the odor abatement requirements of Section 35-144U.C, but the Department is not bound by the Operator's conclusion. If the Department verifies that the Operator is not a contributing source of the reported odor complaint, the complaint shall be deemed resolved.

d. Level 4 Response -- Comprehensive BACT Analysis and Corrective Actions

If, after the Level 3 Response is complete, the Operator continues to observe fugitive odors and/or receives further odor complaints, or the reporting party responds that odor is persisting or recurring periodically during the following 8-24 hour period, the Operator shall implement further corrective actions as follows:

Commission a comprehensive Best Available Control Technology (BACT) analysis and submit to the Department a written report prepared by a Professional Engineer or a Certified Industrial Hygienist that includes:

1. The likely or potential source of the odor complaint;
2. Additional adaptive management techniques, including operational modifications and curtailment that are recommended to eliminate odor complaints;
3. Recommendations for new or revised odor abatement technologies; and
4. Installation of current best available analytical tools to monitor, identify and quantify the emissions causing or contributing to odor complaints.

If the BACT analysis concludes that a more effective odor control system is available that will resolve or materially reduce the severity of the odor causing the complaint the Operator shall take all necessary steps to install the more effective odor control system as expeditiously as practicable. The Operator shall obtain any applicable permits related to project changes resulting from corrective actions before implementing any new odor abatement equipment that is not identified in the OAP. The Operator shall report the conclusions of its investigations (excluding any bona-fide proprietary or trade secret information) to the Department. Once these steps are completed, and the odor is not detectable at the reporting location, the odor complaint shall be deemed resolved.

If no cause for the reported odor complaint was ascertained during diagnostic PE or CIH assessment, and if odor is not detectible at the reporting location, , the Operator shall prepare a written report (excluding any bona-fide proprietary or trade secret information) summarizing the Level 4 Response and submit it to the Department. If after the BACT Analysis, the Operator believes it is not the sole or a contributing source of the reported odor complaint, the Operator shall notify the Department of its conclusion, within three (3) calendar days of reaching such conclusion. The Department will consider this information in determining whether corrective actions are necessary to comply with the odor abatement requirements of Section 35-144U.C, but the Department is not bound by the Operator's conclusion.

e. For all Odor Episodes – Reporting and Corrective Actions:

The Operator shall make available to the Department and any reporting party, upon request, a report detailing all efforts taken to resolve odor complaints.

6.0 Analysis of Other Technologies

Ozone generators are often used for odor control, particularly within the structural restoration industry such as smoke and mold/sewage odor control. However, ozone technology has significant disadvantages and concerns. Ozone is a reactive gas and can be harmful if exposed to humans. OSHA has established permissible exposure limits to workers and the EPA, NIOSH and FDA have all agreed there is an increase health risk if exposed to ozone. Based on this information, we do not recommend the use of ozone as an odor mitigation technology.

Other than the currently approved odor abatement technologies previously discussed within this Plan (i.e., activated carbon filters), Criterion Environmental, Inc. is unaware of any other odor technologies available on the market specifically designed for cannabis odor mitigation.

7.0 Conclusions

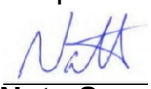
The above mentioned odor control plan is multifaceted and custom to the proposed warehouse building. Multiple technologies and methods will be used to control and mitigate odors, which are informed by best practices and industry data. Odors from the proposed warehouse will be mitigated by carbon filters that will placed in odor emitting rooms. The more odiferous areas of the building will achieve negative pressure, and all doors are equipped with air curtains to guard against release of fugitive odors.

In my professional opinion as a Licensed Professional Engineer (PE) and Certified Industrial Hygienist (CIH), the proposed odor mitigation equipment and methods are consistent with accepted and available industry-specific best control technologies. These technologies and methods, when properly designed and monitored, will mitigate cannabis-related odors from being experienced beyond the property lines and within residential zones.

8.0 Limitations

It should be noted and understood that although cannabis activities have been legalized and permitted within the County, it is expected that illegal and unpermitted commercial and personal growing operations will continue within the immediate area. Some of these operations are not complying with State or County regulations, particularly as it relates to odor abatement and are not in full compliance with the County's standards for odor abatement. Therefore, malodor complaints by the public may be incorrectly directed at the Operator. Cannabis odors, whether "real" or "psychological" are subjective and interpretive, depending on the receptor. If you have any questions, please do not hesitate to call us at 805.432.4888.

Respectfully submitted,



Nate Seward, PE, CIH
Professional Mechanical Engineer (M31978)
Certified Industrial Hygienist (9582 CP)

Attachment 1

Carbon Filter Specifications

Criterion Environmental, Inc.
1879 Portola Road
Suite K
Ventura, CA 93003

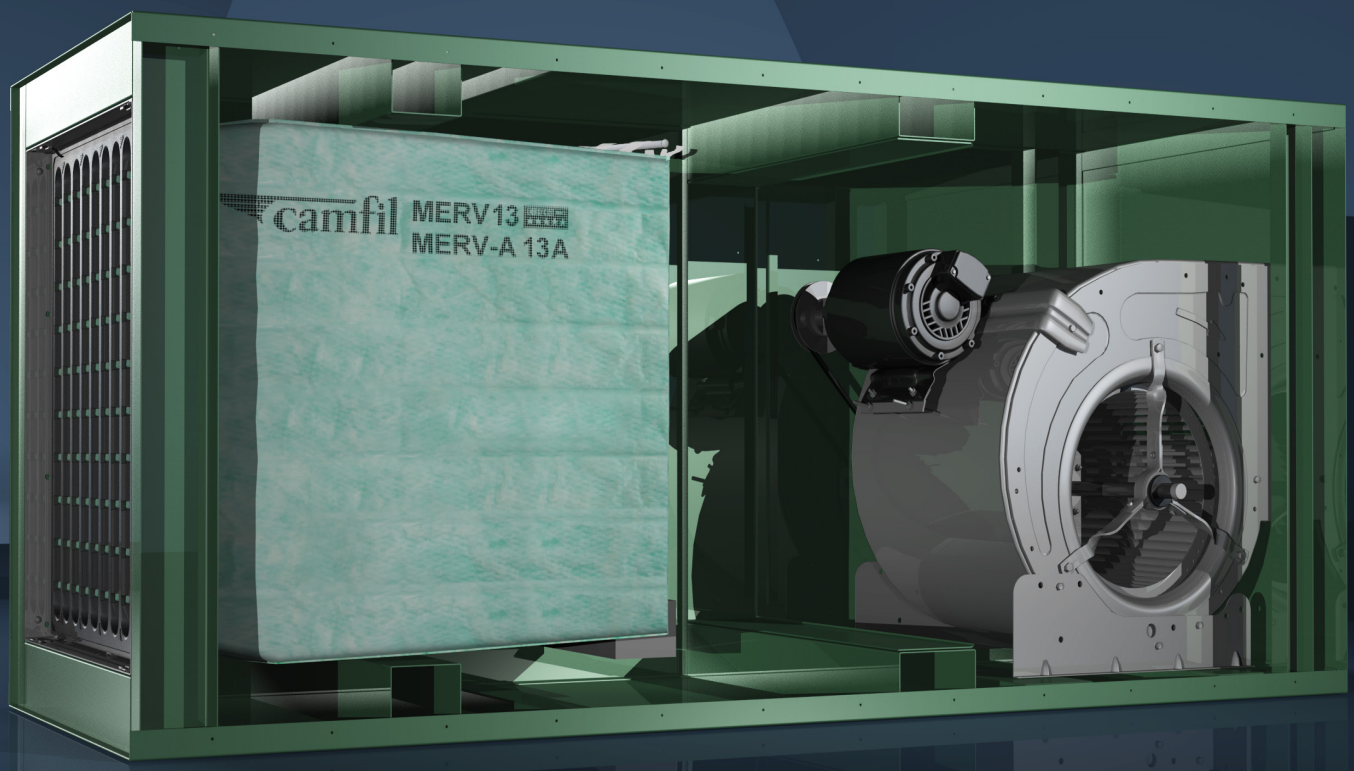
www.criterionenv.com

Phone: 805-644-8347
Fax: 805-644-5347
Email: info@criterionenv.com

camfil

CamCleaner

Air Cleaner for the Removal of Airborne Contaminants



The Best Ever...Inside and Out

The Most Advanced Filtration Technology Available

Clean air solutions

camfil CamCleaner

Contaminant Control

The Camfil CamCleaner is an air cleaner designed for the removal of particulate (standard) and gaseous contaminants (optional) and is typically suspended from a ceiling. Applications include areas that have high load particulate concentrations such as warehouse dust, welding, oil mist, printing, food & beverage and other locations where direct source capture may be difficult. CamCarb adsorbent canisters are also an optional stage of filtration to control odors and gases.

Available in two sizes of air delivery, 2000 and 4000 cfm, the unit accepts multiple stages of air filtration wherein the user can select from a variety of particulate or gaseous/chemical filtration.

1. **A full size air intake** draws contaminants from the room, recirculating the air through each stage of air filtration and back into the conditioned space.

2. **Internal air filter holding assemblies include gasketing** to prevent air bypass and ensure that all of the air is being treated by the system. Primary and secondary air filters are installed from this end of the CamCleaner and installation does not require tools or fasteners.

3. **Filter options:** Air filters can be selected specific to the contaminant of concern. Various configurations include prefiltration, a secondary or final filter, and/or a HEPA or adsorbent filters as the final stage.

4. **2000 or 4000 cfm units** are available. The fan has been specially selected to deliver uniform airflow at a noise level unobtrusive to room occupants.

5. **Adjustable directional louvers** return clean air to the space.

6. **LED indicators** provide a visual indicator for unit ON and particulate air filter pressure drop and unit operation.

7. **CamCleaner service door** provides access to all components and allows convenient change of particulate or cartridge style adsorbers. The door includes a full gasket to eliminate ambient leakage or air filter bypass.

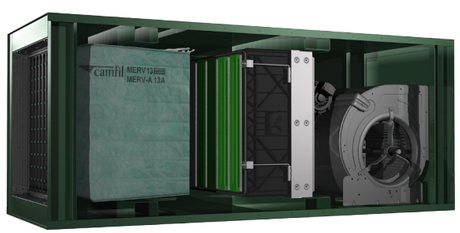
(not shown) A 90º outlet is available as an option to direct conditioned air to a specific area.

5-Star air filters provide 5-Star air cleaner performance. CamCleaners use Farr 30/30®, Hi-Flo® ES and Absolute® VG V-bank HEPA filters with lifetime guaranteed efficiencies.

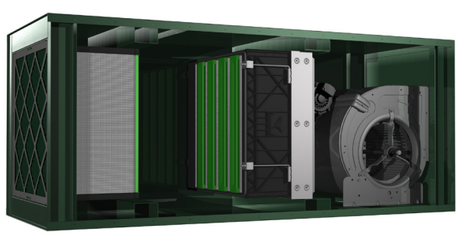
Protect processes such as food & beverage production.

Protect workers and the environment during welding.

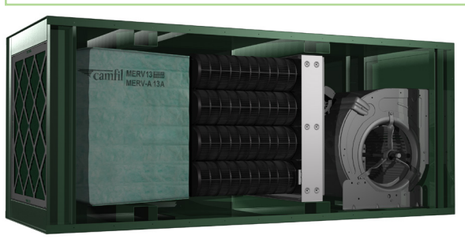
Remove oil mist for environmental safety and reclaim.



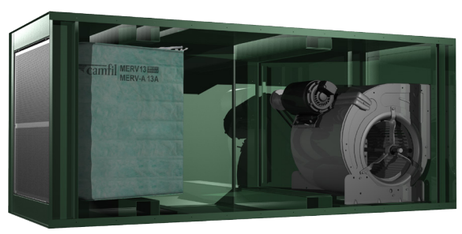
This configuration includes a Camfil Hi-Flo® ES bag filter and an Absolute® VG V-bank HEPA filter. Particulate capture and energy savings are maximized.



This configuration includes a Camfil Farr 30/30®, a Durafil® ES² V-bank filter and an Absolute® VG V-bank HEPA filter for very high loading applications.



This configuration includes the Camfil Farr 30/30®, a Hi-Flo® ES bag filter and Camfil CamSorb adsorbent canister filters for the removal of particulates and gaseous contaminants.



The CamCleaner air cleaner is also available with a filters specific to the removal of mists (including oil). Filters include a Camfil metal mesh mist removal filter and a MERV 13 Hi-Flo® ES bag filter. The unit includes a 1" IPS drain connection for mist collection for reclaim or disposal.

CamCleaner

Air Cleaner for the Removal of Airborne Contaminants

Dimensional and Performance Data	CamCleaner CC2000H	CamCleaner CC4000H
Rated Airflow	2,000 cfm	4,000 cfm
Prefilter	Option	Option
Final filter	(1) HFESMV11/24/24/30/10 or (1) HFESMV13/24/24/30/10	(2) HFESMV11/24/24/30/10 or (1) HFESMV13/24/24/30/10
Canisters	Option	Option
Sound level @ 5 foot perimeter	68 dB	73 dB
Operating weight	450 lbs	500 lbs.
Height	30-3/4"	30-3/4"
Length	77-3/16"	77-3/16"
Width	27-3/4"	53-3/4"
Voltage	120V/1P, 240V/1P, 240V/3P or 480V/3P	120V/1P, 240V/1P, 240V/3P or 480V/3P
Power consumption	820 watts	1,030 watts
Throw (distance @ 100 fpm)	70 feet	100 feet

Data notes: Power consumption and sound ratings performed using 30-inch deep Camfil Hi-Flo ES bag filters only.
Standard electrical supply: 480V/3P

Camfil CamCleaner Specification

1.0 General

Air cleaner shall be self-contained unit with fan, a prefilter section, final filter section, (a HEPA filter section,) and LED indicator lights to identify power on and filter change time.

Construction

– Unit enclosure shall be 16-gauge powder-coated steel. Prefilter and final filter access shall be from air intake end of the unit and shall include an integral filter holding frame that allows filter installation without the use of fasteners.

– The unit shall be designed to accommodate a 2-inch or 4-inch prefilter. The second stage shall be designed to accommodate any headed bag, rigid or V-bank type HVAC air filter. (The third stage shall include a HEPA filter holding frame to accommodate the installation of a V-bank plastic frame HEPA air filter.)

– The fan shall be located at the air exiting side of the unit and shall have a rated capacity of (2000, 4000) cfm with air filters installed.

– An air supply register with adjustable directional louvers shall be installed on the air existing side of the unit. Airflow adjustment shall be either vertical or horizontal.

– Electrical supply shall be (120V/1P, 240V/1P, 240V/3P, 480V/3P)

– The unit shall include two integrated LED lights that shall indicate that the power to the unit is active and another to indicate that the air filters require service.

The unit shall be supplied with one (MERV 11, MERV 13) Hi-Flo ES bag filter. The filter shall also have a MERV-A of (11, 13).

– Manufacturer shall warrant the unit to be free from defects for a period of one year from date of installation.

Required Submittals

– Provide an ASHRAE test report noting filter efficiency of (MERV 11, MERV 13) when tested using ASHRAE Air Filter Testing Standard 52.2. It shall also have a MERV-A of (11, 13) when tested using the same Standard.

* Items in parentheses ( ) require selection).

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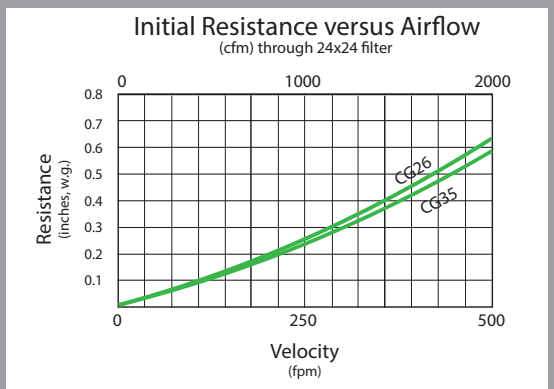
www.camfil.com

CamCarb CG

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

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



Camfil CamCarb CG cylindrical molecular filters are recommended for moderate duty applications in make-up, recirculation, and exhaust air systems. They are especially useful when high removal efficiency and a large quantity of molecular media are required.

Each Camfil CamCarb CG cylinder:

- Is constructed from a combination of PP copolymer and ABS plastics. Available cylinder lengths are 10, 18 and 24 inches, dependent on system airflow. The 24 inch cylinder will typically contain 6.25 lbs of broad-spectrum carbon media.
- Includes a conical air inlet to diffuse air evenly across the molecular media. This ensures that the filter delivers the highest possible efficiency and media lifetime.
- Includes a pair of concentric co-molded rubber gaskets (TEP) that eliminate all leakage between the filter and the permanent mounting plate.
- Includes preformed stainless steel bayonet mounting stubs to attach cylinders to Camfil CamCarb Cylinder Holding Frames. Standard applications include eight cylinders for half size (12" by 24") and sixteen cylinders for full size (24" by 24") frame. See Camfil CamCarb Cylinder Holding Frame for built-up bank installations and CamCarb Cylinder GlidePack for side access applications.
- When filled with media LGX048, CamCarb CG will achieve an Oz 9 rating for ozone removal according to Camfil's unique in-house rating system. Ozone is a pollutant known to harm human health. The World Health Organization (WHO) publishes guidelines for maximum human exposure.

Applications include:

- Commercial building for external souce pollutants (O_3, NO_2, VOCs, SO_2, polyaromatic hydrocarbons -PAH)
- Airports, for control of emissions from jet engines and ground traffic. Laboratory operations and products.
- Light manufacturing processes
- Laboratory operations
- Cultural heritage establishments
- IVF (assisted reproduction) clinics

CamCarb CG cylinders are excellent for the removal of ozone (O_3), automobile fumes and diesel engine exhaust (SO_X, NO_X, H_2S, VOCs), jet engine fumes in airports (SO_X, NO_X, H_2S, VOCs) and light levels of industrial emissions (acid gases, NH_3, solvents).

CamCarb CG

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 23-¼	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.

Media Name	Media Code	Description	Typical Applications
LGX048	LGX048	Granular activated carbon	New construction odors, VOCs, cannabis odor, 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, 84, 94	CP44, CP84, CP94	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.			

Model Designator

CC-CG35-CEX004

- Product Code: CC - CamCarb
- Model and Nominal Length (inches)
- Media Code

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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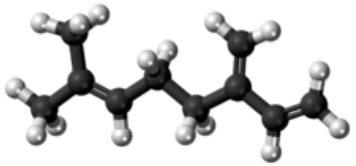
MOLECULAR

Removal of Beta-Myrcene
$C_{10}H_{16}$

Cannabis cultivation

Comparison test (accelerated test)

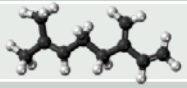
CEX004, LGX048, Campure 8, Campure 84



2018-09-24

CLEAN AIR SOLUTIONS

camfil

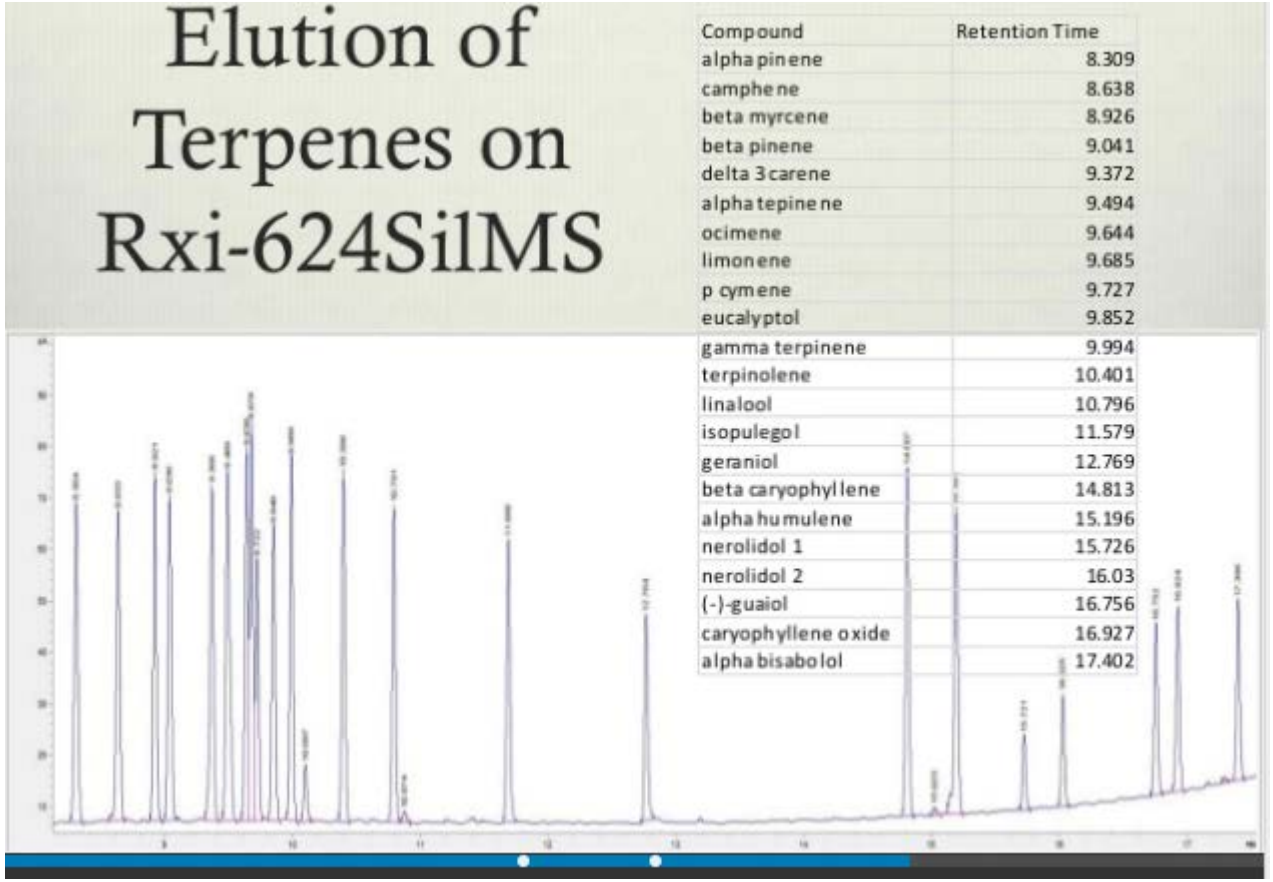
Parameter	Chemical preperties
Substance	Beta-myrcene
Molecule	
Mol.Formula	$C_{10}H_{16}$
Cas No	123-35-3
Mol weight [g/mol]	136.24
Boiling point [^{o}C]	166-168
Vapor pressure @ 23^{o}C [kPa]	0.251
Refractive index	1.471
Density [g/cm^{3}]	0.794
Saturated air @ 23^{o}C [ppm]	2477
Odor threshhold [ppb]	13

Sources:
Wikipedia
Prevent – Chemical substances database
NIST – Chemistry webbook

Myrcene, or β-myrcene, is an olefinic natural organic hydrocarbon. It is more precisely classified as a monoterpene. Monoterpenes are dimers of isoprenoid precursors, and myrcene is a significant component of the essential oil of several plants, including bay, cannabis, ylang-ylang, wild thyme, parsley, cardamom, and hops. It is produced mainly semi-synthetically from myrcia, from which it gets its name. It is a key intermediate in the production of several fragrances. [Wikipedia]

Beta-Myrcene is probably the best marker for Cannabis odor, being one of the most abundant around cannabis grow rooms/cultivation.

Terpenes in Cannabis:



Compound	Retention Time
alpha pinene	8.309
camphene	8.638
beta myrcene	8.926
beta pinene	9.041
delta 3 carene	9.372
alpha tepinene	9.494
ocimene	9.644
limonene	9.685
p cymene	9.727
eucalyptol	9.852
gamma terpinene	9.994
terpinolene	10.401
linalool	10.796
isopulegol	11.579
geraniol	12.769
beta caryophyllene	14.813
alpha humulene	15.196
nerolidol 1	15.726
nerolidol 2	16.03
(-)-guaiol	16.756
caryophyllene oxide	16.927
alpha bisabolol	17.402

Source:
Rebecca Plessel,
Dorman lab, Penn state University

Other VOCs present:
N-heptanal
Toluene
p,m-Xylene
Methyl methacrylate
Ethanol

Source:
TERPENE ODORS ESCAPING FROM CANNABIS GROWING
By Richard L. Knights, Ph.D., Blue Sky Testing Labs, Seattle

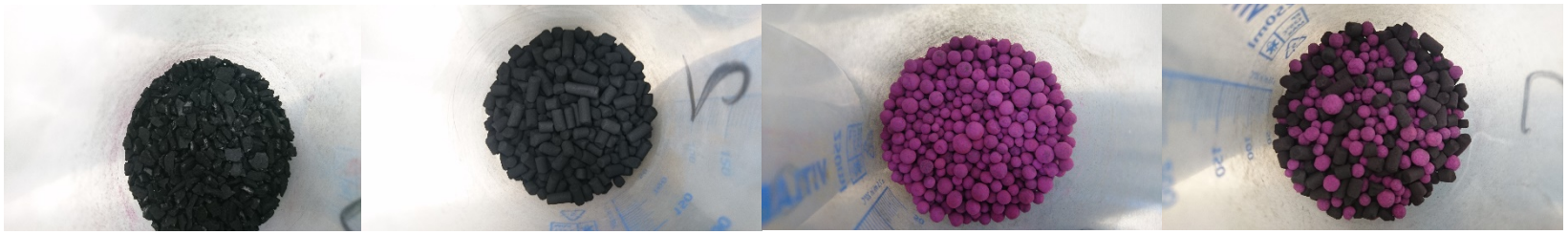
	Odor thresholds
β-Myrcene	13 ppb
α-Pinene	18 ppb
Limonene	38 ppb
B-Pinene	33 ppb

Source:
TERPENE ODORS ESCAPING FROM CANNABIS GROWING
By Richard L. Knights, Ph.D., Blue Sky Testing Labs, Seattle

Test conditions	
Air flow [m^3/h]	1.8
Bed velocity [m/s]	0.26
Bed depth [mm]	26
Bed volume [cm^3]	50
Contact time [sec]	0.1
Temeprature [^oC]	23 ±1
Relative Humidity [%]	47 ±3
Column 1 (empty) – Average upstream concentration [ppm]	8.6 ppm
Column 2 – CEX004 - Filling density [g/cm^3]	0.464
Column 3 – LGX048 - Filling density [g/cm^3]	0.461
Column 4 – Campure 84 - Filling density [g/cm^3]	0.648
Column 5 – Campure 8 - Filling density [g/cm^3]	0.824

- Other chemicals in the air stream will influence the life time.
- Higher RH will reduce the life time.
- Higher temperature will reduce the life time.

	LGX048	CEX004	Campure 8	Campure 84 (CEX004+Campure 8)
Base material	Coconut shell	Coal	Alumina oxide + $KMnO_4$	see CEX004 and Campure 8
CTC [%]***	62	68	2	see CEX004 and Campure 8
Micro pore volume [cm3/g]*	0.39	0.42	0.014	see CEX004 and Campure 8
Micro pore volume [cm3/g]**	0.38	-	-	n/a
Particle size [us.mesh]	4x8	-	-	see CEX004 and Campure 8
Particle size [mm]	-	4	3-5	see CEX004 and Campure 8



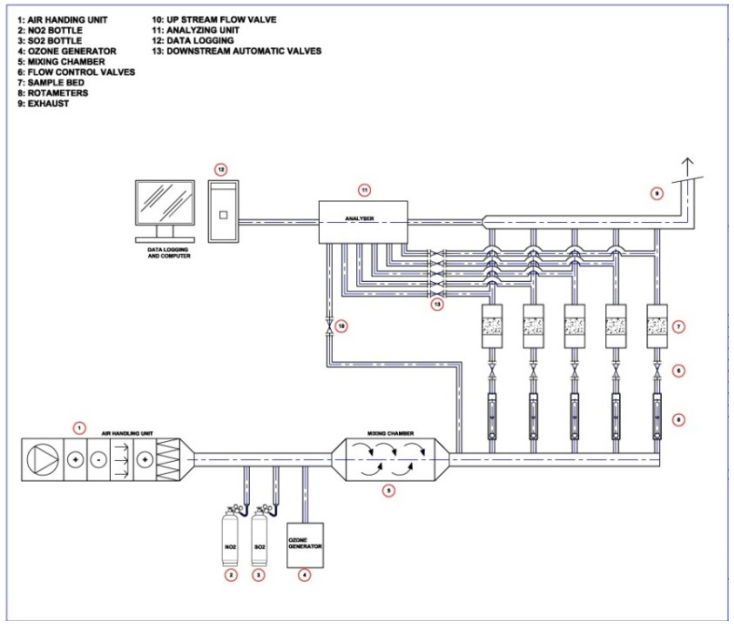
- Calculated from adsorption at Toluene saturated air

** Calculated from adsorption Beta-Myrcene saturated air

** Mesured with Toluene and recalculted into CTC

Description of test method – Molecular Media Test Rig - MMTR

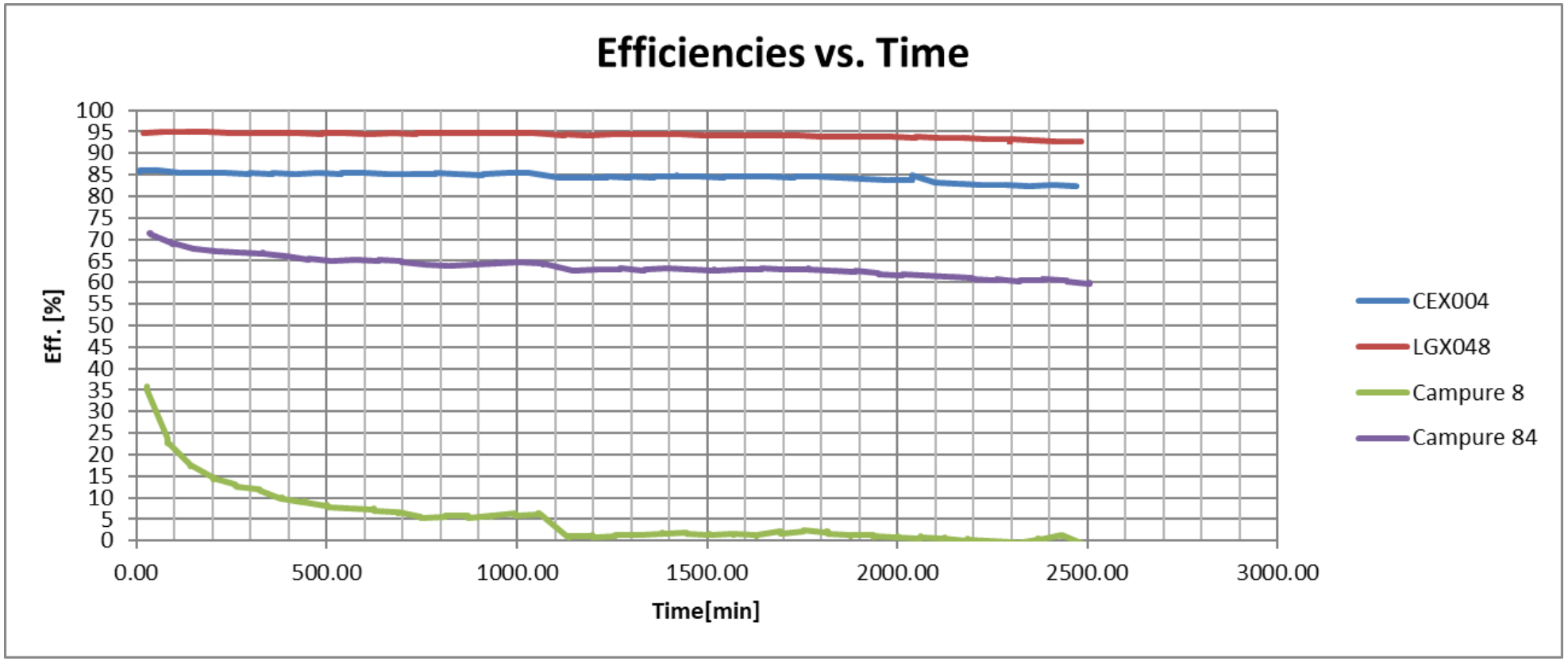
The tests are performed in the Molecular Media Test Rig (MMTR) at the Tech Center in Trosa, Sweden. Isopropanol were used as challenge vapor. The test rig consists of five different columns where the media is placed. The first column is normally kept empty for measuring of upstream concentration during test. An analyzer (table 1) is used to measure the challenge substance concentration both upstream and downstream the samples. This is done by sequentially changing sampling point between the columns. The challenge gas is mixed with temperature and humidified controlled air. See picture 1 and a more detailed schematic drawing in picture 2 below.

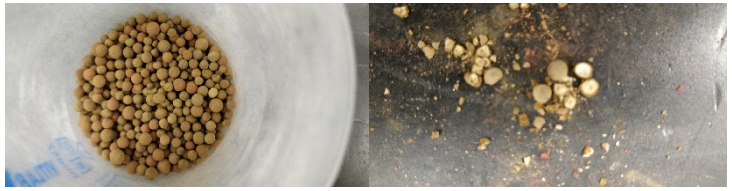


Measuring equipment

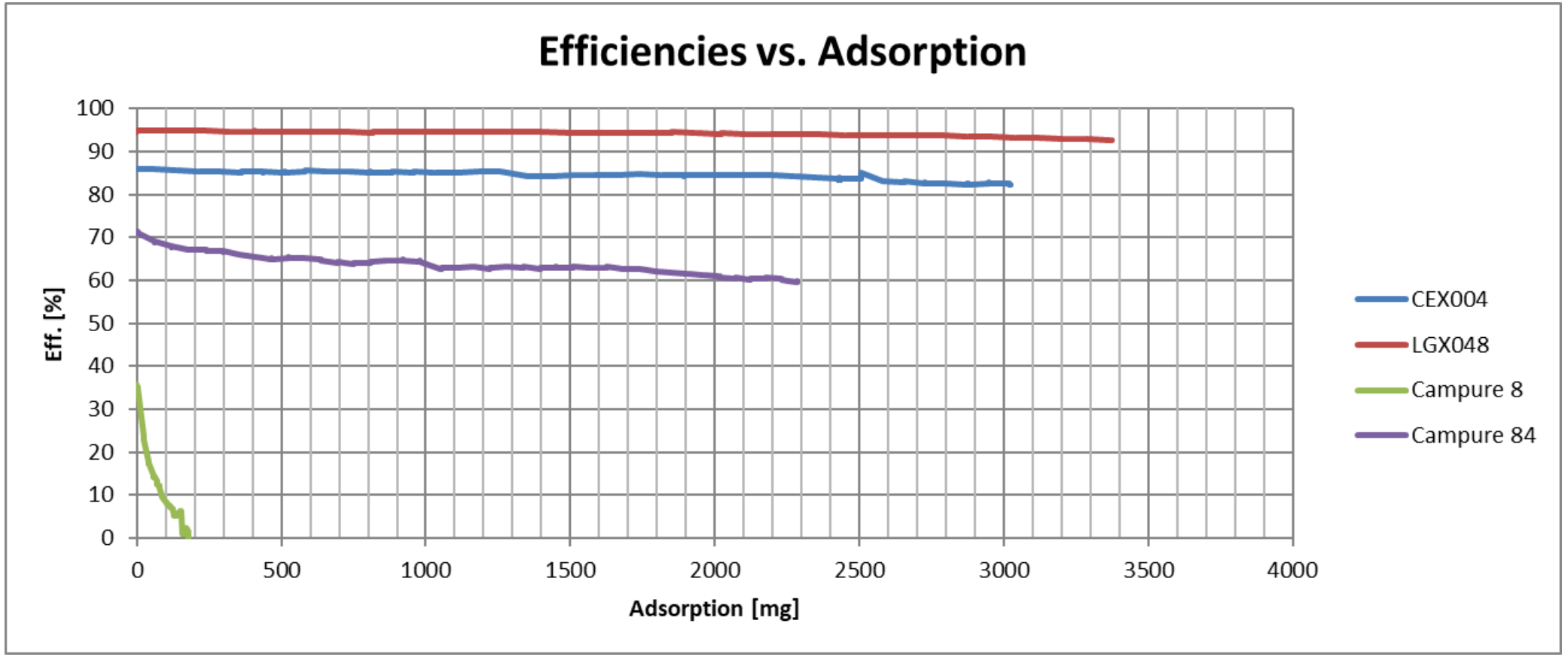
	VOC
Manufacturer	Thermo Environ. Instruments Inc.
Model	Ersatec Smart Fid
Operating principle	FID
Lower detectable limit	≤1,5% of upper range value
Measuring range	0-10 ppm

Test results





It seems like there are chemical reactions going on between KMnO4 and the Myrcene. All Campure 8 beads had turned brownish/white. No red/purple color could be seen visualy.


Efficiencies vs. Adsorption
Eff. [%]
100
90
80
70
60
50
40
30
20
10
0
0
500
1000
1500
2000
2500
3000
3500
4000
Adsorption [mg]
CEX004
LGX048
Campure 8
Campure 84