



DISPOSABLE AIR FILTERS

HONEYCOMB ADSORBENT FILTERS: General purpose filter of honeycomb construction, manufactured in depths up to 6" in standard and custom sizes. Fill content ranges from 25 % to 99 % and can utilize activated carbon, specialty carbons and potassium permanganate media. Recommended for use controlling light odor and contamination in commercial applications. The 75% - 99% fill products are recommended for use in V-Bank installations or in air handling units that can accommodate the higher pressure drop.

HONEYCOMB COMBINATION FILTERS: Dual purpose filter that combines particulate and odor control in one. Utilizes the same construction and fill as above and has particulate efficiency ranging from 30% to 90% ASHRAE. It is available in depths up to 6" in standard and custom sizes. Recommended for systems where space constraints do not allow for individual odor and particulate filters.

BIAS-SORB DISPOSABLE HONEYCOMB V-BANK: High efficiency disposable rigid box type filter. It's design provides low resistance and minimizes retrofit cost. Filter will fit in all front, rear, and side access frames. It contains 21 pounds of activated carbon per 24 x 24 x 12 cell and is rated for a maximum velocity of 500 FPM. Available in standard and custom sizes, the filter can be supplied with any media or combination of media.

VAPORTRAP DISPOSABLE BULK FILL V-BANK: Suitable for initial retrofit applications in both front and side access arrangements. The unique construction of the **VaporTrap** filter means it will hold up in areas of higher humidity and in corrosive atmospheres. Revolutionary bulk fill no honeycomb design. Contains 71 % more media than Bias-Sorb disposable V-Bank. Available in standard and custom sizes with or without headers. It contains 36 pounds of activated carbon per 24 x 24 x 12 cell, specialty media is also available. Ideal for use in removal of molecular contaminants in commercial buildings, airports, hospitals, and many other commercial and industrial applications.

PDM-18 & PDM-12: Plastic disposable module used as a disposable replacement for the MRM18 and MRM 12 refillable modules. The modules offer the same high efficiency as the refillable modules. Since the modules are all half size they are supplied in sets of two.

VT-MDP: The Vapor Trap Metal Disposable Panel is ideally suited for use in front and side access housings as an economical alternative to costly metal refillable panels. Additionally its' construction proves to handle harsher environments than cardboard disposable filters. The VT-MDP is also available in custom sizes making it suitable for OEM or non standard filter replacements.



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

DISPOSABLE HONEYCOMB FILTERS

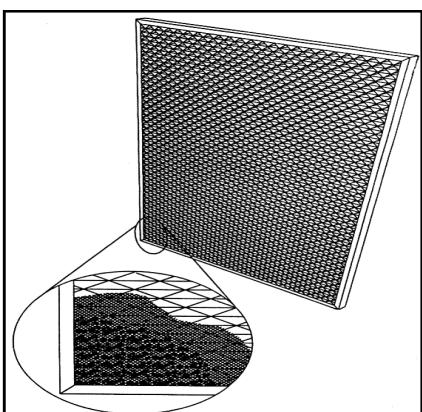
DESCRIPTION

General purpose filter recommended for use in controlling light duty odors in commercial IAQ applications. The filter is available in fill percents from of 25% through 99% and depths up to 4 inches. It can utilize activated carbons, impregnated carbons, specialty media or any combination of the above. The 75%-99% fill products are recommended for use in V-Bank installations or in air handling units that can accommodate the higher pressure drop. Honeycomb filters are not recommended for use in high humidity applications.



CONSTRUCTION AND SPECIFICATIONS

Honeycomb filters are constructed of corrugated kraft cell standard altitude 5/8" and are surrounded by a metal frame of 0.016 aluminum, sealed with a dextrin adhesive. The media is held in the cells with a nylon tolle grill, and adhered to the cells with PVA. Optional frames include 0.032 aluminum and 30 gauge galvanized, die-cut chipboard sealed with a dextrin adhesive. In most applications using the 99% fill, the nylon grille is replaced with aluminum screens on both sides. Optional grills include, spun bond polyester, open cell foam and activated carbon non-woven media, all of which serve as a upstream or downstream dusting filter. The filter can be manufactured using 3/8" cells in thicknesses ranging from 3/8" to 12".



SIZES

Standard sizes include: 16x20, 16x25, 20x20, 20x25, 24x24, and 12x24 in both 7/8" and 1 7/8" thickness. Custom sizes are available. Maximum width is 24", maximum length is 36", maximum depth is 12". Standard undercut is 1/2", custom undercut and exact sizes are readily available.



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DISPOSABLE HONEYCOMB COMBINATION PARTICULATE & ODOR

DESCRIPTION

General purpose filter recommended for use in controlling light duty odors and particulates in commercial IAQ applications. Standard density is 50% fill, with additional options of 25% through 99% fill in depths up to 6 inches. It can utilize activated carbons, specialty media or any combination of the above. Standard 1" filters use a polyester pad, and 2"-6" filters use a MERV 8 pleated polyester media. Additionally polyurethane foam is available as a post stage filter on all sizes. Honeycomb filters are not recommended for use in high humidity applications.



CONSTRUCTION AND SPECIFICATIONS

Standard size filter is constructed of corrugated kraft cell standard altitude 5/8". Chipboard frames are available upon request. The media is held in the cells with a nylon grill, adhered to the cells with PVA. Custom size filters have a 0.016 or 0.032 aluminum or 30 gauge galvanized frame. Chipboard frames are available on standard sizes upon request.

PARTICULATE FILTER RESISTANCE

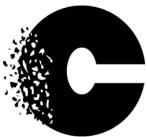
| FILTER THICKNESS | INITIAL 375 FPM | RESISTANCE (WG) 500 FPM |
|------------------|--------------------|----------------------------|
| 1 INCH | 0.14 | 0.24 |
| 2 INCH | 0.12 | 0.20 |
| 4 INCH | 0.10 | 0.16 |

SIZES

Standard Sizes include: 16x20, 16x25, 20x20, 20x25, 24x24, and 12x24 in a 1 7/8"" thickness. Maximum width is 24", maximum length is 36". Standard undercut is 1/2".

VAPOR FILTER RESISTANCE

| THICKNESS FILL% | INITIAL 375 FPM | RESISTANCE (WG) 500 FPM |
|--------------------|--------------------|----------------------------|
| 1/2 INCH | 0.06 | 0.12 |
| 1 INCH | 0.16 | 0.23 |
| 2 INCH | 0.28 | 0.42 |



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Honeycomb Disposable Filter Adsorbent Weight Chart

| | | FILTER THICKNESS | | | | | |
|---------------------------------------------------------------------------------|-------|------------------|------|------|------|-------|-------|
| M E D I A T Y P E & % F I L L | | 3/8" | 1/2" | 5/8" | 3/4" | 1" | 2" |
| | C25 | 61 | 82 | 102 | 122 | 163 | 327 |
| | C50 | 122 | 163 | 204 | 245 | 327 | 653 |
| | C75 | 184 | 245 | 306 | 367 | 490 | 980 |
| | C99 | 245 | 327 | 408 | 490 | 653 | 1,306 |
| | CZK25 | 93 | 127 | 157 | 191 | 255 | 509 |
| | CZK50 | 186 | 255 | 314 | 382 | 510 | 1,018 |
| | CZK75 | 279 | 382 | 471 | 573 | 765 | 1,527 |
| | CZK99 | 372 | 509 | 628 | 764 | 1,020 | 2,036 |
| | ZK25 | 118 | 157 | 196 | 236 | 314 | 628 |
| | ZK50 | 236 | 314 | 392 | 472 | 628 | 1,256 |
| | ZK75 | 354 | 471 | 588 | 708 | 944 | 1,884 |
| | ZK99 | 472 | 628 | 784 | 944 | 1,256 | 2,512 |

WEIGHT OF ADSORBENT IN GRAMS / SQUARE FOOT

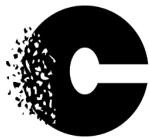
To calculate grams of media in a filter determine the square feet of face area by multiplying the length by the width in inches and dividing by 144. Next select the media type (codes below), percent fill, and thickness. Multiply the grams per square foot on the chart by the number of square feet of face area in your filter. To convert to pounds divide by 454.

C-activated carbon

CZK6-Carbon Potassium Permanganate blend 50/50 by weight

ZK6-Potassium Permanganate

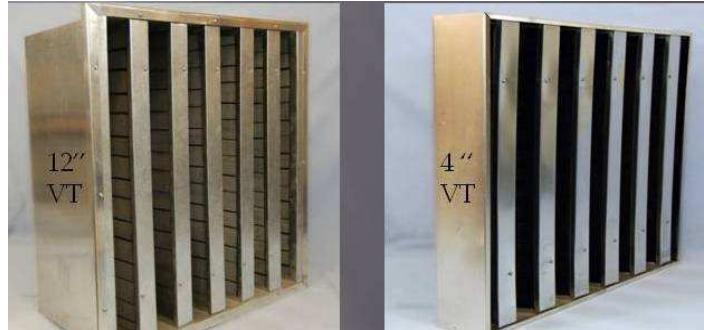
For specialty carbons such as CI-Caustic Impregnated or PA-Acid Impregnated use the gram figures in the C rows and add 13%.



VAPOR TRAP DISPOSABLE V-BANK

FEATURES

- 36 pounds of activated carbon in a nominal 24" x 24" x 12".
- Pressure drop 0.45 iwg @ 2000 CFM.
- Revolutionary bulk fill, no honeycomb design.
- Total detention, no bypass
- Custom media fill available
- Suitable for initial and retrofit applications in both front and side access arrangements.
- Available in custom sizes, length , width and depths from 4" to 12" in both box and header styles.
- Initial efficiency greater than 95 % at rated air flow.
- Moisture resistant construction, allows for use where humidity and moisture are present.



APPLICATIONS

The Vapor Trap disposable v-bank filter is ideally suited for use in both commercial and industrial applications. It's unique design and versatility allows it to be an easy retrofit in any HVAC system, and custom OEM applications. The filter can be supplied as is or with a downstream dusting filter that is an integral part of the filter panel. Designed for high efficiency and long life, it is an economical solution for removal of various contaminants including, diesel fumes, smoke, unwanted food odors, chemical contaminants, outdoor and indoor air pollutants, formaldehyde and ozone.

HOSPITALS

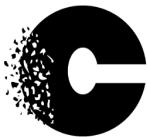
AIRPORTS & CONTROL TOWERS

MUSEUMS & ARCHIVES

BARS & RESTAURANTS

SEMICONDUCTOR APPLICATIONS

INDUSTRIAL FACILITIES



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PERFORMANCE DATA

| Model Number | Face Size, in | CFM | Pressure Drop IWG | Dwell Time, sec. | Media Weight Lbs. | Total Cell Weight, lbs |
|--------------|-----------------|------|-------------------|------------------|-------------------|------------------------|
| VT242412 | 23.375 x 23.375 | 1500 | 0.30 | 0.098 | Carbon : 36 | 53 |
| | | 2000 | 0.45 | 0.074 | C/ZK6 : 50 | 72 |
| | | | | | CI : 41 | |
| VT122412 | 11.375 x 23.375 | 750 | 0.27 | 0.084 | Carbon: 18 | 27 |
| | | 1000 | 0.45 | 0.063 | C/ZK6: 25 | 36 |
| | | | | | CI 20.5 | |

NOTES

1. Standard depth is 11.31. Custom depths from 4" - 12" are available upon request.
2. Filters are available in box, single header, and double header styles.
3. When filter banks incorporate two or more different adsorber sizes, calculate single number approximations of pressure drop and dwell times by multiplying values for each size by their relative filter bank area, and add the results.

SPECIFICATION GUIDE

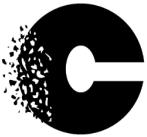
CONSTRUCTION

- Adsorber shall be constructed of multiple media filled panels. Each 24 x 24 x 12 filter shall hold 12 panels arranged in a V-Bank configuration and sealed in a polished aluminum or galvanized frame.
- Individual panels shall be 0.75 inches thick and made of galvanized steel expanded metal with polypropylene supports. The polypropylene supports shall be spaced every 1 1/2" and angled to prevent any bypass.
- Standard media is 4 x 8 or 4 x 6 mesh.
- Panels shall be individually fastened to the frame. Frame shall be fully lined with gasket to prevent bypass.
- Vapor Trap filters shall be individually sealed in a plastic bag, and placed in individual cartons at

PERFORMANCE

- Standard carbon shall have a minimum 60% CTC activity per ASTM D-3467 test method.
- Standard ZK-6 shall have a minimum 6% potassium permanganate.
- A 24 x 24 x 12 inch Vapor Trap shall contain no less than 36 pounds of carbon and no less than 50 pounds of C/ZK-6 and no less than 72 pounds of ZK6.
- The air resistance on a 24 x 24 x 12 nominal shall be no more than 0.50 in. of WG when operating at 2000 CFM.
- Adsorber shall be designed for total detention gaseous contamination control.

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VAPORTRAP ZK6 (DF)

APPLICATIONS

A DISPOSABLE V-BANK FILTER SPECIFICALLY DESIGNED FOR THE REMOVAL ACID GASES and FORMALDEHYDE

FILTER SPECIFICATIONS

| | |
|---------------------------------------|--------------------------------------|
| RATED AIR VELOCITY, Maximum | 500 FPM |
| AIR FLOW RESISTANCE, Maximum | 0.45 IWG .050 with dusting filter |
| FIRST PASS REMOVAL EFFICIENCY | > 95 % |
| MEDIA WEIGHT, Minimum (24 x 24 cell) | 66 POUNDS |

| Residence Time | |
|----------------|---------------|
| 500 fpm | .08 seconds * |
| 375 fpm | .11 seconds |

* The minimum recommended residence time for high efficiency gas phase filters is .07 seconds. While the filter can be operated at higher velocities it will cause overall filter efficiency to decrease

CONSTRUCTION

- Adsorber shall be constructed of multiple media filled panels, arranged in a V-Bank configuration and sealed in a polished aluminum frame.
- Individual panels shall be 0.75 inches thick and made of galvanized steel expanded metal with polypropylene supports.
- Panels shall be fastened to the frame. Frame shall be fully lined with gasket to prevent bypass.
- Vapor Trap filters shall be individually sealed in a plastic bag, and placed in individual cartons at the factory.
- DF: downstream dusting filter

Filter life expectancy is dependent upon several factors. Contaminants present and their concentration, humidity in the air stream and filter efficiency. Life expectancy of the filter is proportional to the weight of media in the filter. The more media the longer the life. In general commercial applications the VT242412ZK6 is expected to last between 1 and 2 years.



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MOLECULAR FILTRATION SPECIALISTS

VAPORTRAP C/ZK6 (DF)

APPLICATIONS

A MULTIPURPOSE DISPOSABLE FILTER FOR REMOVAL OF VOLATILE ORGANIC COMPOUNDS, ACID GASES, DIESEL FUMES AND FORMALDEHDYE.

FILTER SPECIFICATIONS

| | |
|---------------------------------------|--------------------------------------|
| RATED AIR VELOCITY, Maximum | 500 FPM |
| AIR FLOW RESISTANCE, Maximum | 0.45 IWG .050 with dusting filter |
| FIRST PASS REMOVAL EFFICIENCY | > 95 % |
| MEDIA WEIGHT, Minimum (24 x 24 cell) | 54 POUNDS |

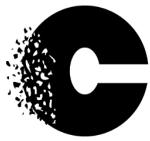
| Residence Time | |
|----------------|---------------|
| 500 fpm | .08 seconds * |
| 375 fpm | .11 seconds |

* The minimum recommended residence time for high efficiency gas phase filters is .07 seconds. While the filter can be operated at higher velocities it will cause overall filter efficiency to decrease

CONSTRUCTION

- Adsorber shall be constructed of multiple media filled panels, arranged in a V-Bank configuration and sealed in a polished aluminum frame.
- Individual panels shall be 0.75 inches thick and made of galvanized steel expanded metal with polypropylene supports.
- Panels shall be fastened to the frame. Frame shall be fully lined with gasket to prevent bypass.
- Vapor Trap filters shall be individually sealed in a plastic bag, and placed in individual cartons at the factory.
- DF: downstream dusting filter

Filter life expectancy is dependant upon several factors. Contaminants present and their concentration, humidity in the air stream and filter efficiency. Life expectancy of the filter is proportional to the weight of media in the filter. The more media the longer the life. In general commercial applications the VT242412C/ZK6 is expected to last between 1 and 2 years.



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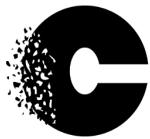
MOLECULAR FILTRATION SPECIALISTS

VT242412 C- SH vs Vari-Pure 242412

FILTER SPECIFICATIONS

| | CGL VT-C | Vari-Pure—C |
|-------------------------|------------------|------------------|
| RATED AIR FLOW | 2000 CFM | 2000 CFM |
| RATED AIR VELOCITY, MAX | 500 FPM | 500 FPM |
| AIR FLOW RESISTANCE | 0.42 IWG | 0.76 IWG |
| MEDIA WEIGHT | 36 pounds | 18 pounds |
| MOISTURE RESISTANT | Yes | Yes |
| DUSTING FILTER | Optional | Optional |

Filter life expectancy is dependent upon several factors. Contaminants present and their concentration, humidity in the air stream and filter efficiency. Life expectancy of the filter is proportional to the weight of carbon media in the filter. Based on those numbers under identical conditions the Vapor Trap will adsorb twice the amount of contaminants from the air stream.



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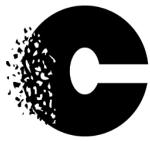
VT242412 C- SH

FILTER SPECIFICATIONS

| | CGL VT-C | Vari-Pure Lite |
|-------------------------------|-----------|----------------|
| RATED AIR FLOW | 2000 CFM | 2000 CFM |
| RATED AIR VELOCITY, MAX | 500 FPM | 500 FPM |
| AIR FLOW RESISTANCE | 0.42 IWG | 0.33 IWG |
| FIRST PASS REMOVAL EFFICIENCY | > 95 % | 95% |
| MEDIA WEIGHT | 36 pounds | 18 pounds |
| REMOVAL EFFICIENCY | >95 % | Not Given |

| Performance | | | |
|-------------------------------------------------------------------|--------------|-------------|-------------|
| Air Volume | Air Velocity | CGL C | CGL - |
| 2000 cfm | 500 fpm | .10 seconds | .10 seconds |
| Capacity, toluene , grams * Calculated based on carbon content | | 5393 | 2697 |

Filter life expectancy is dependant upon several factors. Contaminants present and their concentration, humidity in the air stream and filter efficiency. Life expectancy of the filter is proportional to the weight of carbon media in the filter. Based on those numbers under identical conditions the Vapor Trap will adsorb twice the amount of contaminants from the air stream.



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VT242412-C-SH vs VK-10-PH

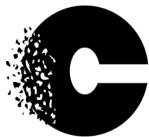
FILTER SPECIFICATIONS

| | CGL—C | Vari-Klean— carbon |
|-------------------------------|-----------------------|-----------------------|
| RATED AIR FLOW | 2000 CFM | 2000 CFM |
| RATED AIR VELOCITY, MAX | 500 FPM | 500 FPM |
| Initial Resistance, IWG | 0.45 | 0.40 |
| FIRST PASS REMOVAL EFFICIENCY | > 95 % | 95% |
| MEDIA WEIGHT | 36 pounds | 6 pounds |
| CONTAMINANT REMOVAL GUIDE | General Purpose VOC's | General Purpose VOC's |
| OPERATING WEIGHT | 49 pounds | - |

There are a few items to point out. The initial resistance of the Vapor Trap filter remains constant provided it is protected from particulate contamination. An optional downstream dusting filter is available.

The activity of the VariKlean carbon is 90 CTC, and the CGL carbon is 60 CTC. The 1.5 time increase in activity would be equivalent to 9 pounds of a 60 CTC carbon, still less than one third the weight of carbon in the Vapor Trap Filter. The higher activity carbon and finer particle size used in the VariKlean filter is necessary to offset the low media weight and lack of bed depth.

Life expectancy of the filter is proportional to the weight of media in the filter. If you compare media weights of the VTC to the VariKlean, life expectancy of the Vapor Trap will be 3 times longer than that of the Vari-Kelan filter..



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VT242412C/ZK6—SH

FILTER SPECIFICATIONS

| | CGL C/ZK6 | Vari-Klean– Premium |
|-------------------------------|-----------------------------------------------|-----------------------------------------------|
| RATED AIR FLOW | 2000 CFM | 2000 CFM |
| RATED AIR VELOCITY, MAX | 500 FPM | 500 FPM |
| AIR FLOW RESISTANCE | 0.45 IWG | 0.5 IWG |
| FIRST PASS REMOVAL EFFICIENCY | > 95 % | 95% |
| MEDIA WEIGHT | 50 pounds | 8 pounds |
| CONTAMINANT REMOVAL GUIDE | ACID GASES, FORMALDEHYDE, DIESEL FUMES, VOC'S | ACID GASES, FORMALDEHYDE, DIESEL FUMES, VOC'S |
| OPERATING WEIGHT | 70 pounds | 20 pounds |

Performance

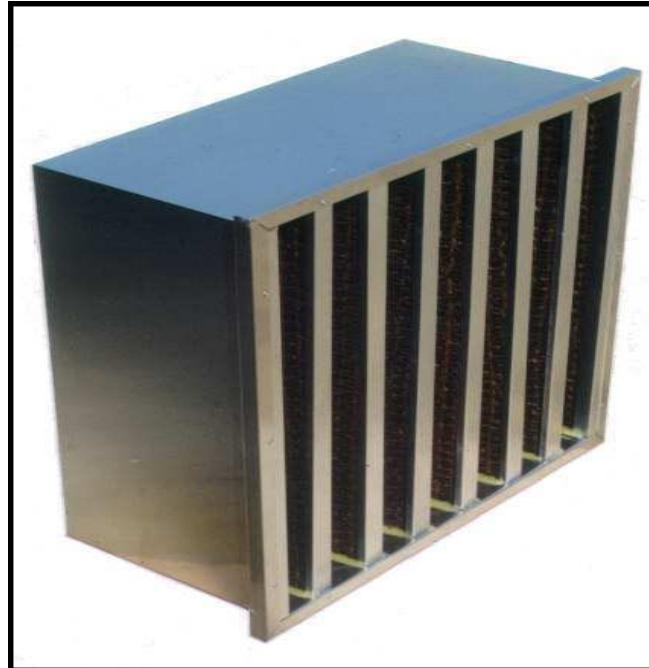
| Air Volume | Air Velocity | CGL C/ZK6 | Vari-Klean |
|---------------------------|--------------|----------------|--------------|
| 2000 cfm | 500 fpm | .08 seconds ** | .046 seconds |
| Capacity, toluene , grams | | 3745 | 947 |
| Capacity, H2S, grams | | 1250 | 527 |

Filter life expectancy is dependant upon several factors. Contaminants present and their concentration, humidity in the air stream and filter efficiency. Life expectancy of the filter is proportional to the weight of media in the filter. If you compare media weights of the VTCZK6 to the VariKlean life expectancy should be longer by 3 times. The above numbers represent individual contaminants.



BIAS -SORB

**HONEYCOMB
DISPOSABLE
V-BANK
CARBON
ADSORBER**



FEATURES

Completely disposable

**Total detention modular
Bias cut design**

**Suitable for initial/retrofit
applications in both front load and
side access arrangements**

**Optional impregnated carbons
and potassium permanganate
media available**

BENEFITS

→ Installation is clean and easy

**→ Low pressure drop and high
efficiency**

**→ Eliminates expensive retrofit
costs by using existing
equipment**

**→ Control a wide variety of
contaminants with one filter**



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PERFORMANCE DATA

| Model Number | Face Size, in | CFM | Pressure Drop IWG | Dwell Time sec | Media Weight* Lbs. | Total Cell Weight, lbs |
|--------------|-----------------|------|-------------------|----------------|--------------------|------------------------|
| BS242412 | 23.375 x 23.375 | 1500 | 0.23 | 0.098 | Carbon : 21 | 30 |
| | | 2000 | 0.43 | 0.074 | ZK6 : 42 | 51 |
| BS122412 | 11.375 x 23.375 | 750 | 0.27 | 0.084 | Carbon: 9 | 15 |
| | | 1000 | 0.5 | 0.063 | ZK6: 18 | 24 |

NOTES

1. All Bias-Sorb filters are 11.25" in depth.
2. Filters are available as box style, single header, and double header**.
3. When filter banks incorporate two or more different adsorber sizes, calculate single number approximations of pressure drop and dwell times by multiplying values for each size by their relative filter bank area, and add the results.
4. Custom sizes available. Please call the factory for information.

SPECIFICATION GUIDE

CONSTRUCTION

- Adsorbers shall be constructed of multiple media filled panels, arranged in a V-Bank configuration and sealed in a polished aluminum frame.
- Individual panels shall be 0.625 inches thick and made of corrugated kraft honeycomb bias cut for low air resistance and longer dwell times
- Standard media is 8 x 12 mesh.
- Panels shall be sealed to the frame with a fire retardant adhesive.
- Bias-Sorb filters shall be individually sealed in a plastic bag, and placed in individual cartons at the factory.

PERFORMANCE

- Standard carbon shall have a minimum 60% CTC activity per ASTM d-3467 test method.
- Standard ZK-6 shall have a minimum 6% potassium permanganate.
- A 24 x 24 x 12 inch Bias-Sorb shall contain no less than 21 pounds of carbon and no less than 42 pounds of ZK-6.
- The air resistance on a 24 x 24 x 12 nominal shall be no more than 0.43 in of WG when operating at 2000 CFM.
- Absorbers shall be designed for total detention gaseous contamination control and shall be UL900 Class II listed.



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VT-MDP

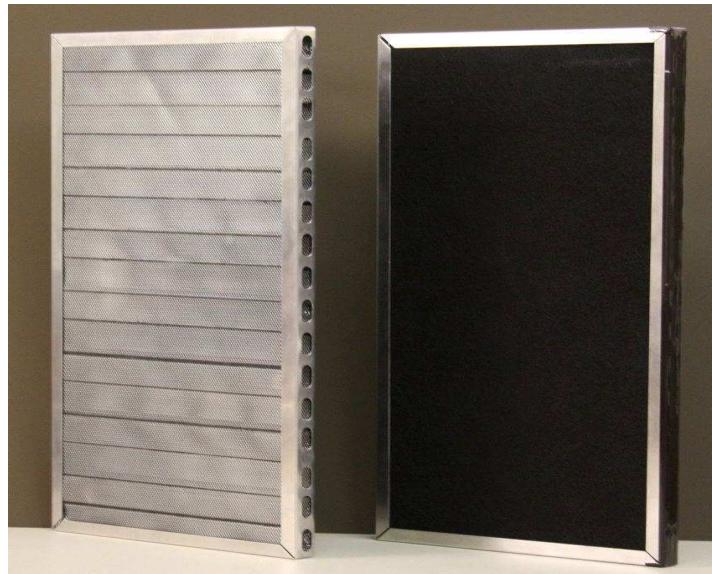
The **VaporTrap-Metal Disposable Panel** is ideally suited for use in front and side access housings. It uses the already proven Vapor Trap V-bank technology to offer an economical alternative to costly metal refillable panels. In addition the technology also allows for custom sizes to be easily manufactured. It is available in depths from 0.75" and greater.

It's versatility allows it to be used as a replacement for disposable bonded panels, by the addition of a downstream dusting filter.

The VT-MDP can be produced as a partial bypass filters by filling alternating cells, offering lower pressure drop for non v- bank applications.

FEATURES

- Moisture resistant—no paper or cardboard
- Angled polyethylene supports to prevent bypass in the event of media settling.
- Downstream dusting filter available.
- Easily manufactured in custom widths and lengths-
- Various media fills available.



SPECIFICATIONS

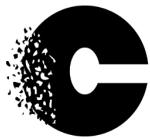
A 24 x 24 x 1.75, 50 % fill panel contains 6.75 pounds of carbon or 9 pounds of a blend of C/ZK6. Pressure drop @ 500 fpm not to exceed .044 iwg. A 24 x 24 x .875 50 % fill contains 3.25 pounds of carbon or 6.5 pounds of a C/ZK6 blend. Pressure drop @ 500 fpm not to exceed .35 iwg.

When replacing a refillable panel pressure drop and media weight will be consistent with the metal refillable panel.

CONSTRUCTION

The panel is constructed of galvanized steel expanded metal with polyethylene supports. The supports are angled to prevent contaminant bypass.

Filter frame is galvanized metal.



CGL – PDM18 & PDM 12 MODULES

PRODUCT DESCRIPTION

The CGL-PDM18 & PDM 12 modules are designed for use in both front and side access housings. These versatile modules have been manufactured to give the end user the option of disposal or refilling.

They can be filled with any number of media types or blends to suit your specific application. They are ideal for use in both commercial and industrial applications, including office buildings, airports, hospitals, semiconductor facilities, wastewater treatment plants and many other areas where air cleaning is of concern.



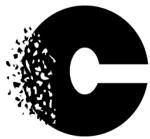
PDM-18

SPECIFICATIONS

PDM-12

- Each 12" x 6" x 18" inch module is rated for 250 cfm.
- Temperature ranges up to 125 F.
- Frame is 0.100 polystyrene with 0.056x 0.500 slotted screens and is incinerable.
- Filter bed depth 1.25".
- Pressure drop not to exceed 0.49 inches of water gauge at 500 ft./minute.
- Each module (set) is designed to hold 12 pounds of CGL CP48, CCS, 24 pounds of CGL ZK6, and 18 pounds of CP48/ZK6 blended media.

- Each 12" x 12" x 12" inch module is rated for 125 cfm.
- Temperature ranges up to 125 F.
- Frame is 0.100 polystyrene with 0.056x 0.500 slotted screens and is incinerable.
- Filter bed depth 3.0".
- Pressure drop not to exceed 1.4 inches of water gauge at 250 ft./minute.
- Each module (set) is designed to hold 19 pounds of CGL CP48, CCS, 38 pounds of CGL ZK6, and 26 pounds of CP48/ZK6 blended media.



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

ACF-AM

ACF-AM is an activated carbon impregnated filter media specially treated for the removal of ammonia and amines from air. Ideally suited for use in room air cleaning devices. The media can be custom cut to fit your needs.



PHYSICAL PROPERTIES

| | |
|-------------------------------------|---------------------|
| Base Substrate | Non-Woven Polyester |
| Activated carbon, g/sq ft | 9.5 |
| Ammonia removal, % by weight | 12 |
| Nominal Thickness | 1/8" |

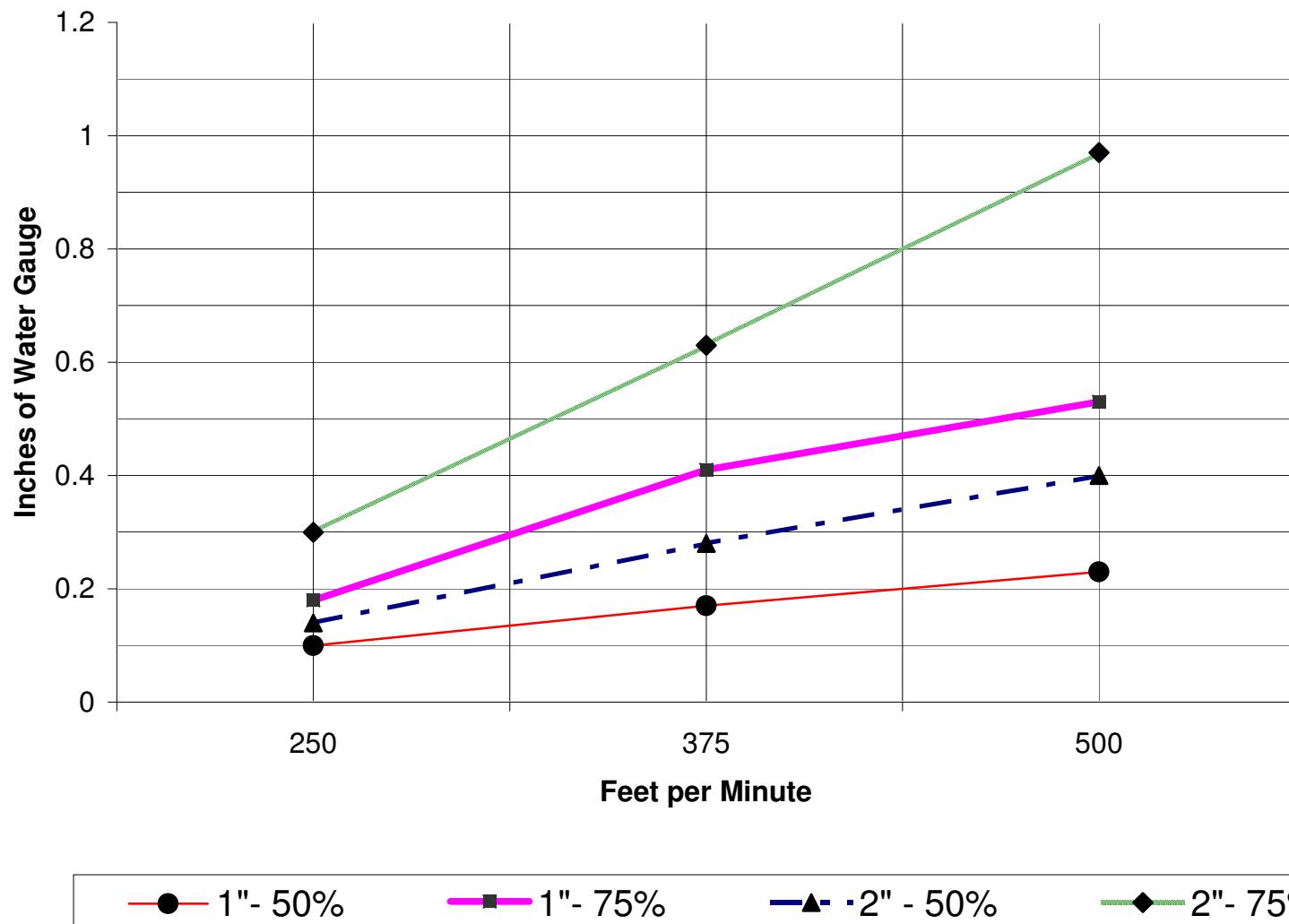
Typical Applications:

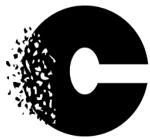
- Beauty Salons:
- Pet Shops
- Veterinary Clinics
- Nursing Homes
- General home use

Pads can be used to help control odors associated with compounds used for hair permanents, urine smells, and household cleaning compounds formulated with ammonia.

CAMERON GREAT LAKES, INC

Pressure Drop Disposable Honeycomb Filters

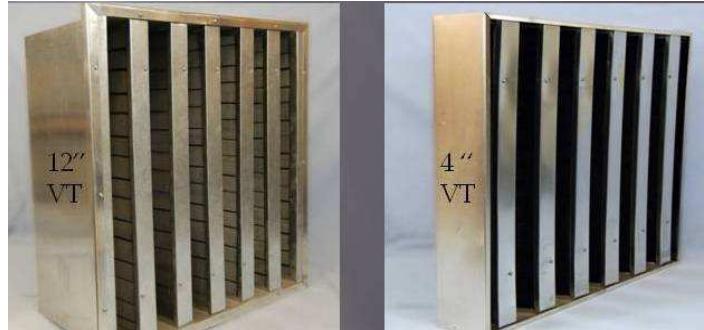




VAPOR TRAP DISPOSABLE V-BANK

FEATURES

- 36 pounds of activated carbon in a nominal 24" x 24" x 12".
- Pressure drop 0..45 iwg @ 2000 CFM.
- Revolutionary bulk fill, no honeycomb design.
- Total detention, no bypass
- Custom media fill available
- Suitable for initial and retrofit applications in both front and side access arrangements.
- Available in custom sizes, length , width and depths from 4" to 12" in both box and header styles.
- Initial efficiency greater than 95 % at rated air flow.
- Moisture resistant construction, allows for use where humidity and moisture are present.



APPLICATIONS

The Vapor Trap disposable v-bank filter is ideally suited for use in both commercial and industrial applications. It's unique design and versatility allows it to be an easy retrofit in any HVAC system, and custom OEM applications. The filter can be supplied as is or with a downstream dusting filter that is an integral part of the filter panel. Designed for high efficiency and long life, it is an economical solution for removal of various contaminants including, diesel fumes, smoke, unwanted food odors, chemical contaminants, outdoor and indoor air pollutants, formaldehyde and ozone.

HOSPITALS

AIRPORTS & CONTROL TOWERS

MUSEUMS & ARCHIVES

BARS & RESTAURANTS

SEMICONDUCTOR APPLICATIONS

INDUSTRIAL FACILITIES



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

PERFORMANCE DATA

| Model Number | Face Size, in | MAX: CFM | Cubic ft. of media | Carbon lbs | C/ZK6 lbs | Cell Weight, lbs (carbon) |
|--------------|-----------------|----------|--------------------|------------|-----------|---------------------------|
| VT242412 | 23.375 x 23.375 | 2000 | 1.2 | 36 | 50 | 53 |
| VT24246 | 23.375 x 23.375 | 2000 | 0.6 | 18 | 25 | 27 |
| VT24244 | 23.375 x 23.375 | 2000 | 0.4 | 12 | 16 | 18 |

NOTES

1. Standard depth is 11.31. Custom depths from 4" - 8" are available upon request.
2. Filters are available in box, single header, and double header styles.
3. Custom sizes are available.
4. All filters can be supplied with an optional downstream dusting filter.

SPECIFICATION GUIDE

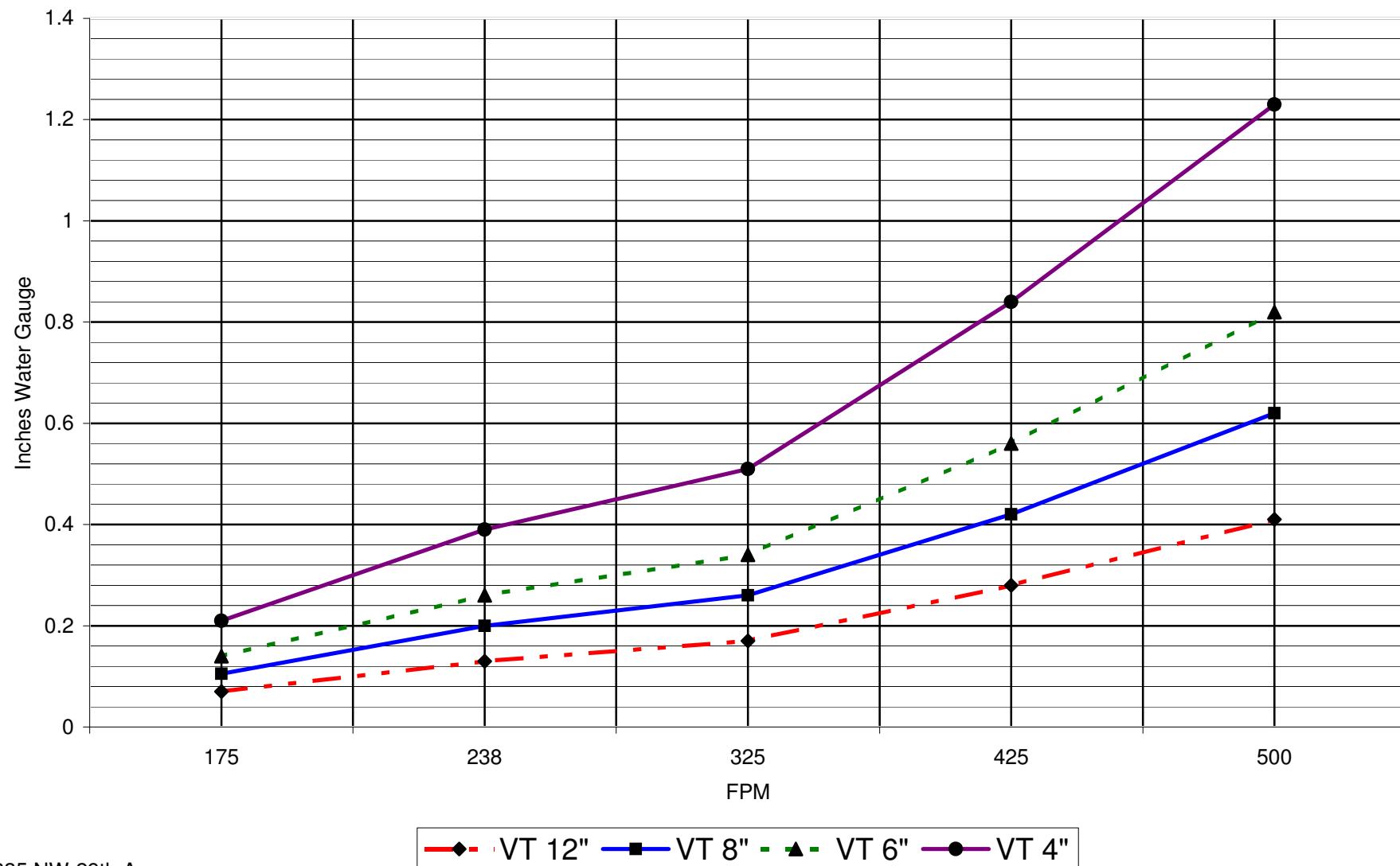
CONSTRUCTION

- Adsorber shall be constructed of multiple media filled panels. Each 24 x 24 x 12 filter shall hold 12 panels arranged in a V-Bank configuration and sealed in a polished aluminum or galvanized frame.
- Individual panels shall be 0.75 inches thick and made of galvanized steel expanded metal with polypropylene supports. The polypropylene supports shall be spaced every 1 1/2" and angled to prevent any bypass.
- Standard media is 4 x 8 or 4 x 6 mesh.
- Panels shall be individually fastened to the frame. Frame shall be fully lined with gasket to prevent bypass.
- Vapor Trap filters shall be individually sealed in a plastic bag, and placed in individual cartons at the factory.

PERFORMANCE

- Standard carbon shall have a minimum 60% CTC activity per ASTM D-3467 test method.
- Standard ZK-6 shall have a minimum 6% potassium permanganate.
- A 24 x 24 x 12 inch Vapor Trap shall contain no less than 36 pounds of carbon and no less than 50 pounds of C/ZK-6 and no less than 72 pounds of ZK6.
- The air resistance on a 24 x 24 x 12 nominal shall be no more than 0.50 in. of WG when operating at 2000 CFM.
- Adsorber shall be designed for total detention gaseous contamination control.

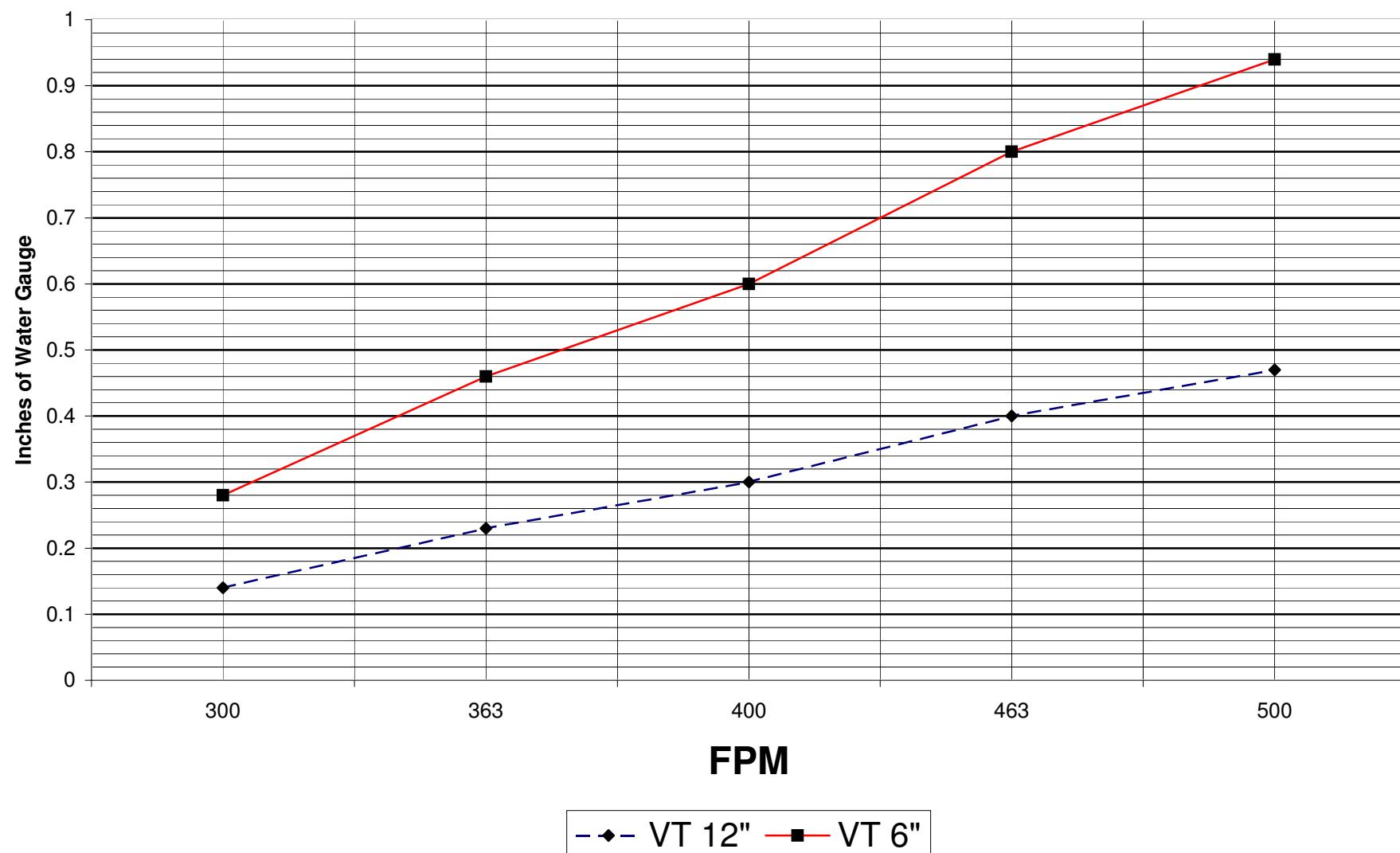
VaporTrap Box Style Pressure Drop Graph



2335 NW 29th Ave
Portland OR 97210

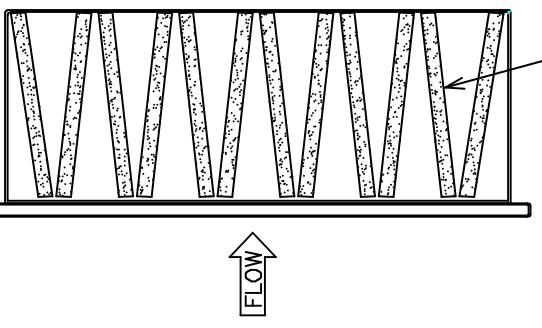
(800) 777-4044

VaporTrap Single Header Pressure Drop Graph



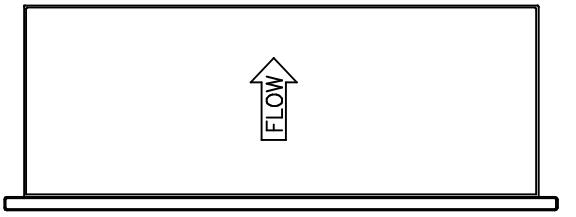
**INTERNAL VIEW
SHOWING "V" BANK
PANEL ARRANGEMENT**

SINGLE HEADER ↗ ADSORBER FRAME



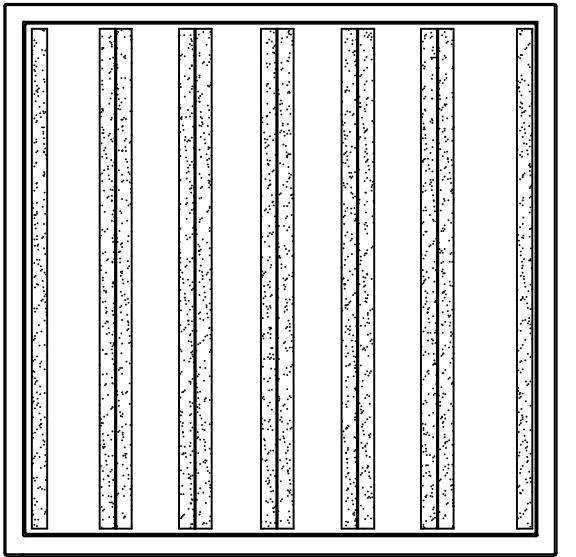
CARBON PANELS
100 PERCENT FILL
WITH 4x8 MESH GAC
@ 3 LBS./PANEL =
36 LBS. GAC {FULL}
18 LBS. GAC {HALF}

↗ 11.375 DEPTH
→ 0.75 HEADER



SIDE VIEW

→ 23.375 WIDTH



**RIGHT END VIEW
FACING AIR OUTLET**

↑ 23.375 HEIGHT (FULL)
↓ 11.375 HEIGHT (HALF)

NOTE - SINGLE HEADER TYPE FILTER SHOWN.
BOX STYLE AND DOUBLE HEADER STYLE ALSO
AVAILABLE WITH SIMILAR OUTSIDE DIMENSIONS.

CAMERON GREAT LAKES, INC.
2335 NW 29th AVE. PORTLAND, OR 97210
TEL. 800-777-4044 FAX 503-225-0137

GENERAL ARRANGEMENT
VAPOR TRAP DISPOSABLE V-BANK
FULL SIZE (NOMINAL 24 X 24 X 12 IN.)
HALF SIZE (NOMINAL 12 X 12 X 12 IN.)

| DRAWN | JMB | TITLE |
|------------|-----|--------------------------------------|
| A 08/15/00 | JMB | VAPOR TRAP DISPOSABLE V-BANK |
| - 07/17/00 | JMB | FULL SIZE (NOMINAL 24 X 24 X 12 IN.) |
| | PJL | HALF SIZE (NOMINAL 12 X 12 X 12 IN.) |
| | RAH | |

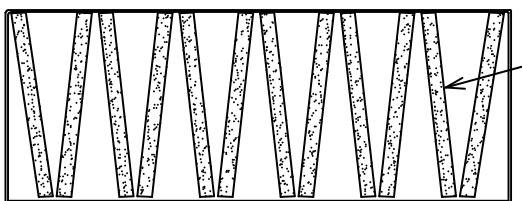
| REV. | DATE | BY | REMARKS |
|------|------|----|---------|
| | | | |

NOTE - DIMENSIONS ARE FOR
REFERENCE ONLY,
DO NOT USE FOR
CONSTRUCTION UNLESS
MARKED "CERTIFIED" BY CGI.

**INTERNAL VIEW
SHOWING "V" BANK
PANEL ARRANGEMENT**

→ 11.375 DEPTH

↙ ADSORBER FRAME



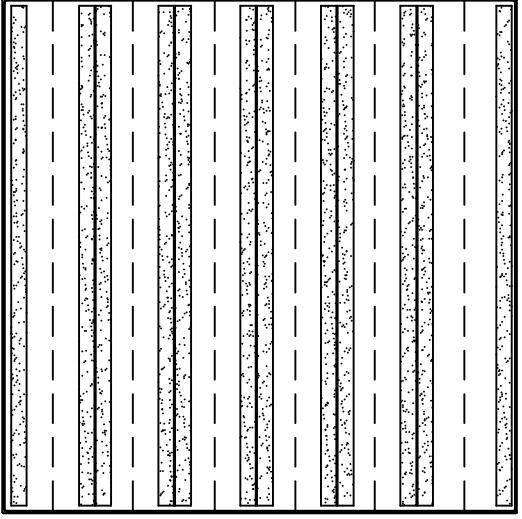
FLOW

CARBON PANELS
100 PERCENT FILL
WITH 4x8 MESH GAC
@ 3 LBS./PANEL =
36 LBS. GAC (FULL)
18 LBS. GAC (HALF)

SIDE VIEW

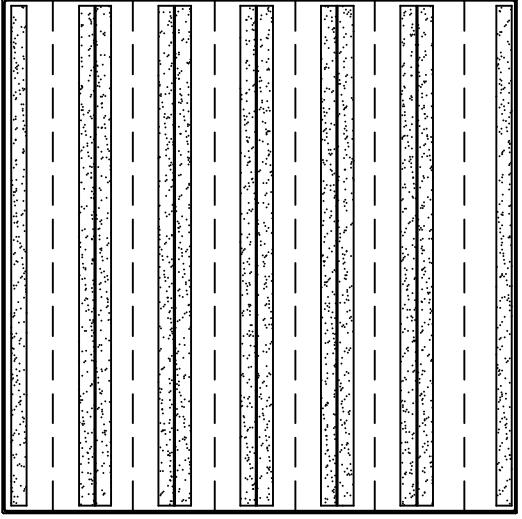
FLOW

→ 23.375 WIDTH



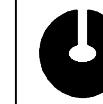
**RIGHT END VIEW
FACING AIR OUTLET**

FLOW



FLOW

NOTE - BOX TYPE FILTER SHOWN. SINGLE
HEADER AND DOUBLE HEADER STYLE ALSO
AVAILABLE WITH SIMILAR OUTSIDE DIMENSIONS.



CAMERON GREAT LAKES, INC.

2335 NW 29th AVE. PORTLAND, OR 97210
TEL. 800-777-4044 FAX 503-225-0137
TITLE: GENERAL ARRANGEMENT
DRAWING NO. V-BANK
CHECKED: PJL APPROVED: RAH
SCALE: N.T.S. Dwg. No. VAPOR TRAP BOX STYLE

| MATERIALS OF CONSTRUCTION | | | |
|---------------------------|-------------------------------------------------------------------------|--|--|
| GAC PANELS | GALV. STEEL EXPANDED METAL - 0.75 IN. THICK WITH POLYPROPYLENE SUPPORTS | | |
| ADSORBER FRAME | 0.032 IN. THICK POLISHED ALUMINUM | | |
| SINGLE HEADER | 0.75 IN. WIDE ONE PIECE ALUMINUM | | |

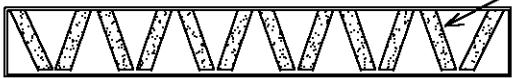
| HOUSING SIZE | FULL | HALF | |
|---------------------|-----------|-----------|--|
| NO. OF PANELS | 12 | 6 | |
| MAX. FLOW (CFM) | 2000 | 1000 | |
| TOTAL WEIGHT (LBS.) | <u>56</u> | <u>27</u> | |

NOTE - DIMENSIONS ARE FOR
REFERENCE ONLY.
DO NOT USE FOR
CONSTRUCTION UNLESS
MARKED "CERTIFIED" BY CGI.

**INTERNAL "V" BANK
SHOWING "V" BANK
PANEL ARRANGEMENT**

3.875 →
DEPTH

ADSORBER
FRAME



FLOW

CARBON PANELS —
100 PERCENT FILL
WITH 4x8 MESH GAC
@ 1 LB./PANEL =
12 LBS. GAC

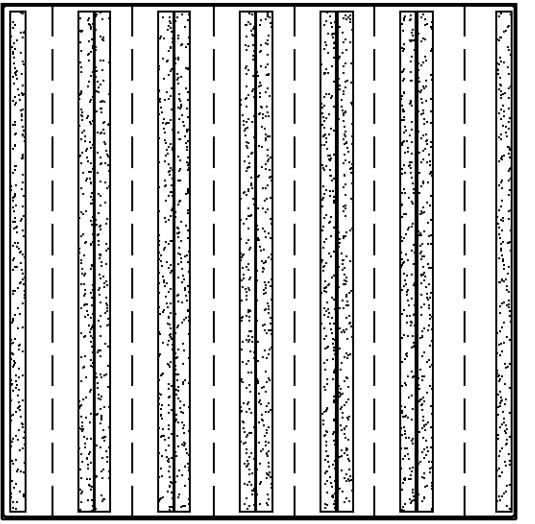
3.875 →
DEPTH



FLOW

SIDE VIEW

← 23.375 WIDTH →



**RIGHT END VIEW
FACING AIR OUTLET**

↑
23.375 HEIGHT

| MATERIALS OF CONSTRUCTION | |
|---------------------------|-------------------------------------------------------------------------|
| GAC PANELS | GALV. STEEL EXPANDED METAL - 0.75 IN. THICK WITH POLYPROPYLENE SUPPORTS |
| ADSORBER FRAME | 0.032 IN. THICK POLISHED ALUMINUM |
| SINGLE HEADER | 0.75 IN. WIDE ONE PIECE ALUMINUM |

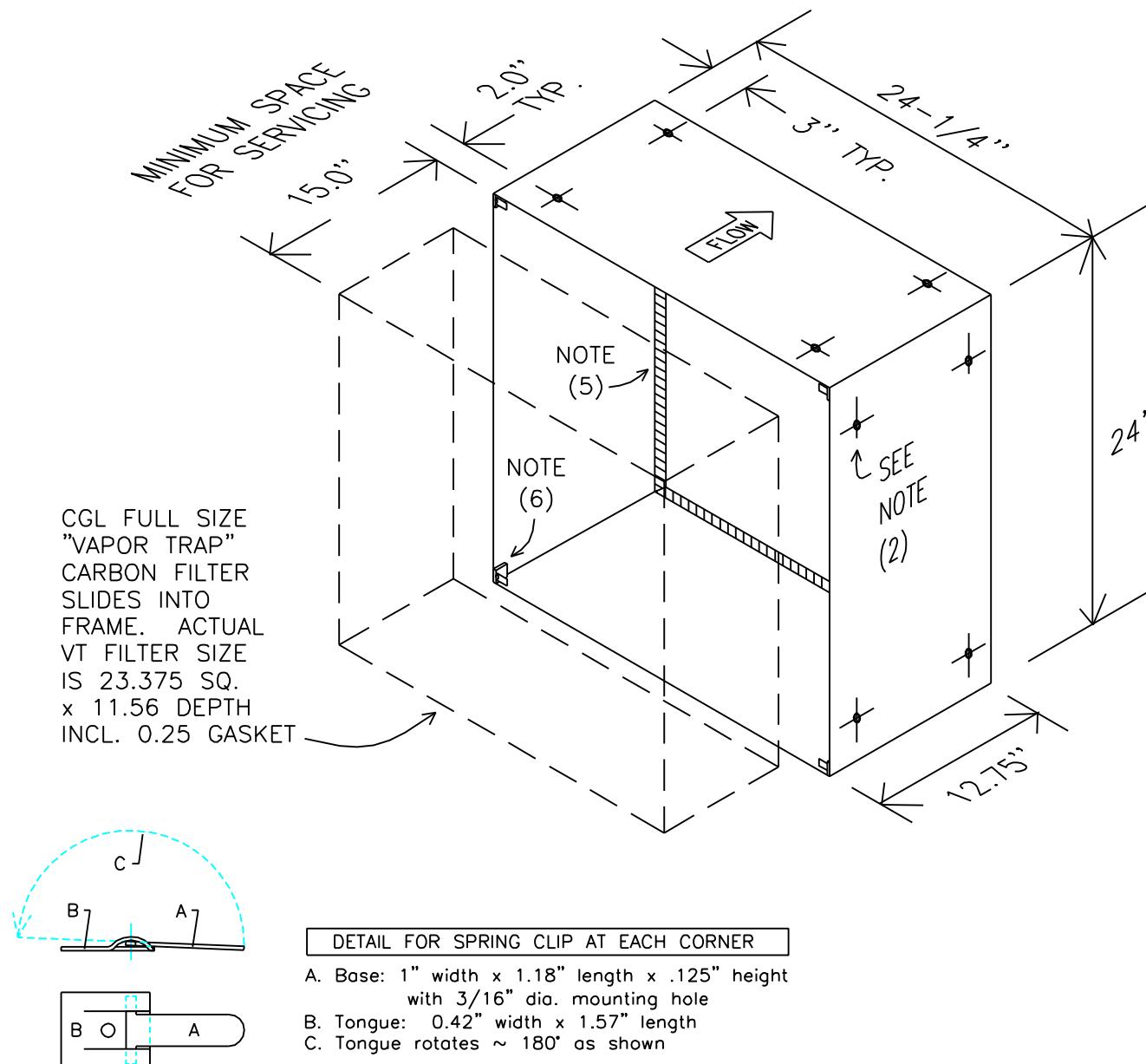
| HOUSING SIZE | FULL |
|---------------------|-----------|
| NO. OF PANELS | 12 |
| MAX. FLOW (CFM) | 2000 |
| TOTAL WEIGHT (LBS.) | <u>22</u> |

NOTE — DIMENSIONS ARE FOR REFERENCE ONLY.
DO NOT USE FOR CONSTRUCTION UNLESS MARKED "CERTIFIED" BY CGL.

NOTE — BOX TYPE FILTER SHOWN. SINGLE HEADER AND DOUBLE HEADER STYLE ALSO AVAILABLE WITH SIMILAR OUTSIDE DIMENSIONS.

| | |
|------------------------------------|---------------------------------|
| CAMERON GREAT LAKES, INC. | |
| 2335 NW 29th AVE. | PORTLAND, OR 97210 |
| TEL. 800-777-4044 | FAX 503-225-0137 |
| TITLE: GENERAL ARRANGEMENT | |
| VAPOR TRAP DISPOSABLE V-BANK | |
| NOMINAL SIZE 24 x 24 x 4 IN. DEPTH | |
| DRAWN: | JMB |
| CHECKED: | PJL |
| APPROVED: | RAH |
| REV. | DATE |
| BY | REMARKS |
| SCALE: N.T.S. | DRG NO. 24x24x4" VAPOR TRAP BOX |

MODEL FAFF FRONT ACCESS FILTER FRAME



FEATURES AND NOTES

1. Frames can be installed as front or rear access.
2. Modular frames bolt or pop-rivet together to form banks of any capacity. Four (4) X 0.215" dia. holes are provided on sides, top & bottom to allow easy field connection of modular frames to each other.
3. Frames can be custom sized to fit into existing air handlers and ducts.
4. When attaching or stacking frames, use a sealant or gasketing between the frames to avoid air bypass. Gaskets, if used, must be applied to front and back edges of housing to keep joints between frames parallel.
5. Outlet end of frame has a 3/4" flange both ways to provide a sealing surface for the gasket on the outlet end of the box style CGL Vapor Trap carbon filter. The VT filter slides into the holding frame.
6. The Vapor Trap filter is pushed toward the back of the housing to seal the gasket by four (4) spring clips. The clips are mounted in each corner as shown.

| MATERIAL OF CONSTRUCTION | | | |
|------------------------------------------------------------------------------------------------------|--|--|--|
| 16 GA. COLD ROLLED CARBON STEEL WITH ALUMINIZED FINISH OR BLACK COLOR POWDER COAT EPOXY PAINT FINISH | | | |

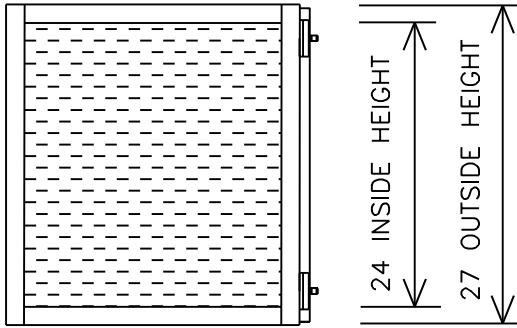
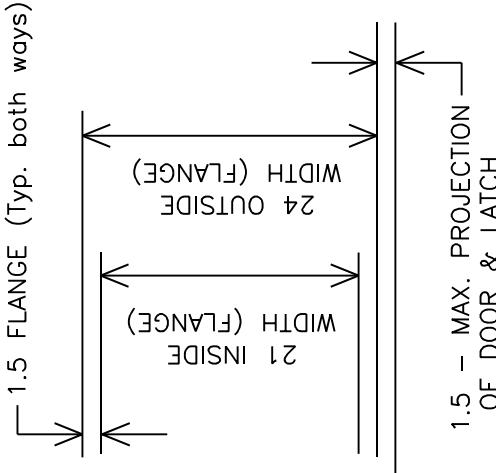
| PROPRIETARY DRAWING | | | |
|--------------------------------------------------------------------------------------------------|----------|-----|-----------------------|
| DRAWING MAY NOT BE USED OR REPRODUCED WITHOUT WRITTEN AUTHORIZATION OF CAMERON GREAT LAKES, INC. | | | |
| DIMENSIONAL TOLERANCE = +/- 0.030 IN. | | | |
| B | 07/26/10 | JMB | REVISE FRAME WIDTH |
| B | 08/23/05 | JMB | REVISE FILTER DEPTH |
| A | 07/21/05 | JMB | REVISE FINISH OPTIONS |
| REV. | DATE | BY | REMARKS |



CAMERON GREAT LAKES, INC.

2335 NW 29th AVE PORTLAND, OR 97210
TEL: 800-777-4044 FAX: 503-225-0137

TITLE: MODEL FAFF - FRONT ACCESS FILTER FRAME FOR SIZE 242412 VAPOR TRAP CARBON FILTER
SCALE: N.T.S. DWG NO. FAFF-VT-242412



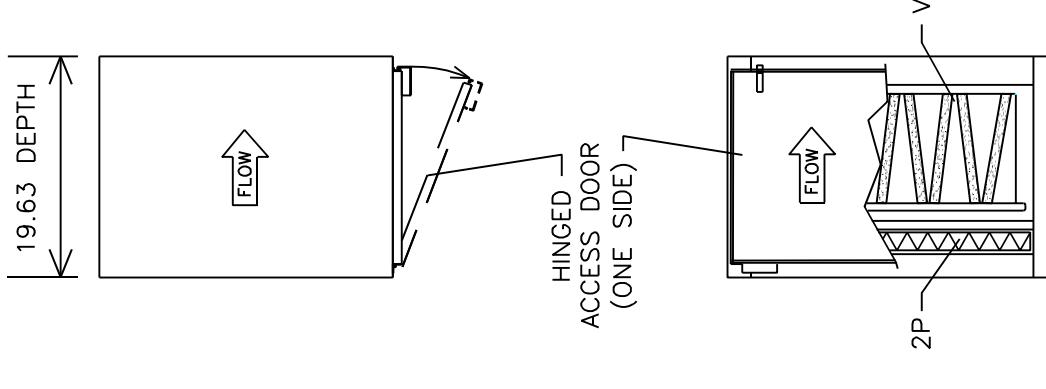
| MODEL NO. SA1H1W-2P-VT | |
|------------------------|----------------------------|
| SA | - SIDE ACCESS HOUSING |
| 1H | - 1 MODULE HIGH |
| 1W | - 1 MODULE WIDE |
| 2P | - 2 IN. DEPTH PREFILTER * |
| VT | - VAPOR TRAP FILTER MODULE |

APPROXIMATE WEIGHTS:

VAPOR TRAP FILTER MODULE FILLED
WITH GAC-ZK6 BLEND (LBS.) 72
+ APPROX. EMPTY HOUSING WEIGHT 146
+ 2" DEPTH PREFILTER * 2
TOTAL APPROX. OPERATING WEIGHT 220

HSG MATERIAL - 16 GA. CR CARBON STEEL,
STITCH WELDED & CALUKED. STANDARD
FINISH: ALUMINIZED INSIDE & OUT. OPTIONAL
FINISH: URETHENE ENAMEL (SPECIFY COLOR)

END VIEW FACING OUTLET



VT - VAPOR TRAP FILTER MODULE
NOM. FULL SIZE - 24 x 24 x 12
ILLED WITH GAC-ZK6 BLEND
2P - PRE-FILTER TRACK - NOMINAL
SIZE 24 x 24 x 2" DEPTH
(*) PREFILTER PROVIDED BY OTHERS

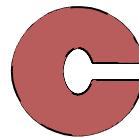
2000 CFM MAXIMUM AIR FLOW

PROPRIETARY DRAWING

DRAWING MAY NOT BE USED OR
REPRODUCED WITHOUT WRITTEN
AUTHORIZATION OF CGL, INC.

DIMENSIONS ARE FOR REFERENCE ONLY.
DO NOT USE FOR CONSTRUCTION UNLESS
MARKED "CERTIFIED" BY CGL.

| | | | |
|------|----------|-----|----------------|
| B | 07/20/09 | JMB | REV. NOTES |
| A | 03/09/04 | JMB | REV. AIR FLOW |
| -- | 03/03/04 | JMB | ORIGINAL ISSUE |
| REV. | DATE | BY | REMARKS |



CAMERON GREAT LAKES, INC.

2336 NW 29th AVE. TEL. 800-777-4044
PORTLAND, OR 97210 FAX 503-225-0137

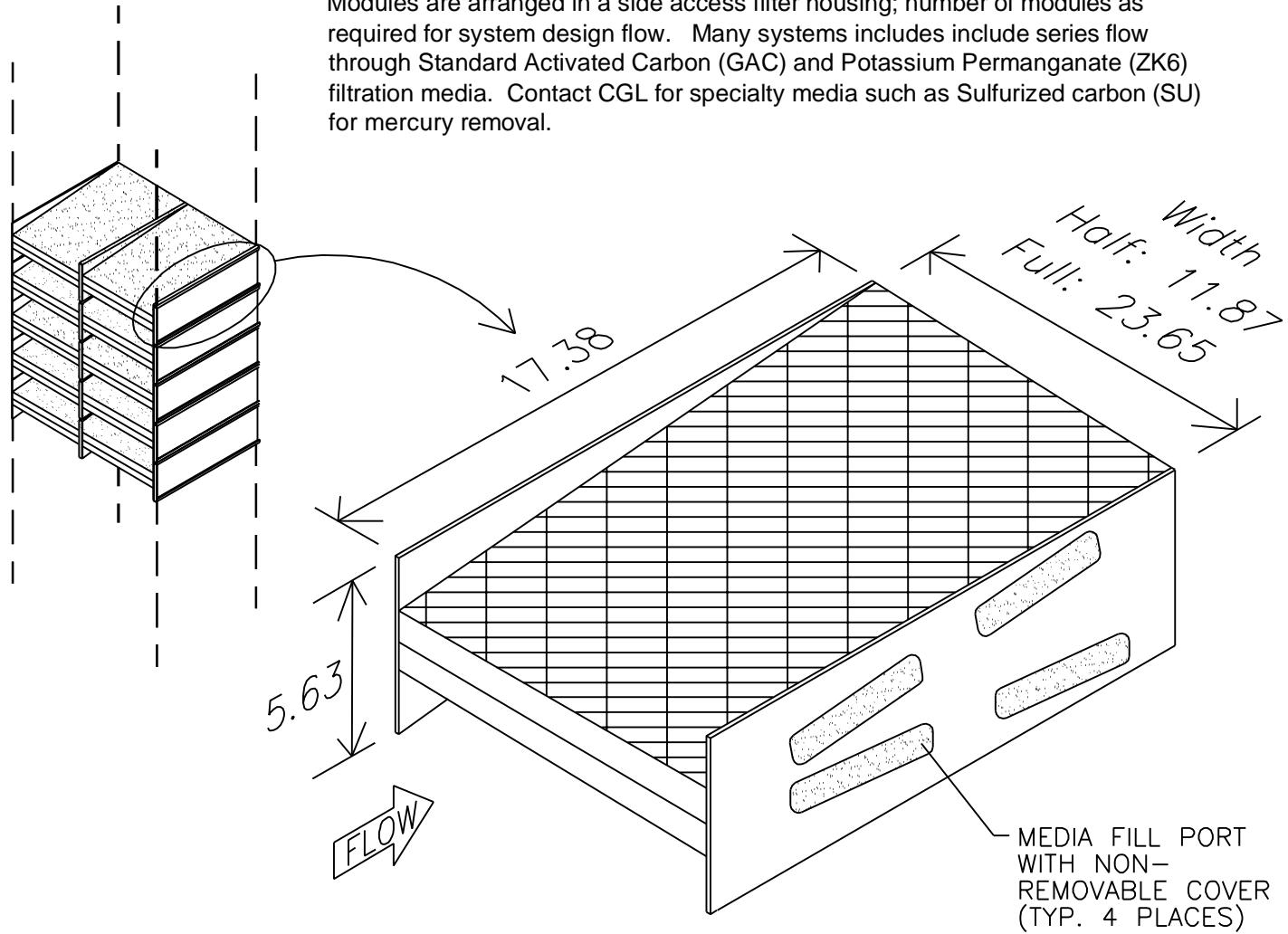
DRAWN: JMB TITLE: GENERAL ARRANGEMENT
CHECKED: PJL MODEL NO. SA1H1W-2P-VT
APPROVED: JMB SIDE ACCESS FILTER HOUSING
SCALE: N.T.S. DWG NO. SA1H1W-2P-VT

PDM-18 FILTER MODULE

Available in HALF Size (11.87" Width) and FULL Size (23.65" Width)

TYPICAL INSTALLATION

Modules are arranged in a side access filter housing; number of modules as required for system design flow. Many systems include series flow through Standard Activated Carbon (GAC) and Potassium Permanganate (ZK6) filtration media. Contact CGL for specialty media such as Sulfurized carbon (SU) for mercury removal.



DATA FOR FULL SIZE (23.65" W) MODULE *

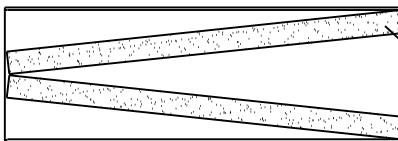
| MODULE FILL MEDIA | GAC | ZK6 |
|-------------------------|-----|-----|
| NO. OF FILTER BEDS | 2 | 2 |
| MAXIMUM FLOW (CFM) | 500 | 500 |
| APPROX. WEIGHTS (LBS.): | | |
| EMPTY MODULE | 4 | 4 |
| FILL MEDIA | 18 | 36 |
| TOTAL WEIGHT | 22 | 40 |

MATERIALS OF CONSTRUCTION

0.100 POLYSTYRENE FRAME
WITH .056 x .500 SLOTTED
SCREENS.

PRESSURE DROP AT 500
CFM FLOW = 0.5 IN.W.G.

MODULE IS INCINERABLE



FILTER PANELS
1.25 INCH DEPTH

INTERNAL VIEW SHOWING "V" BANK FILTER BED ARRANGEMENT

PROPRIETARY DRAWING

DRAWING MAY NOT BE USED OR REPRODUCED
WITHOUT WRITTEN AUTHORIZATION OF
CAMERON GREAT LAKES, INC.

TOLERANCES: LENGTH: +/- 0.125 IN.



CAMERON GREAT LAKES, INC.

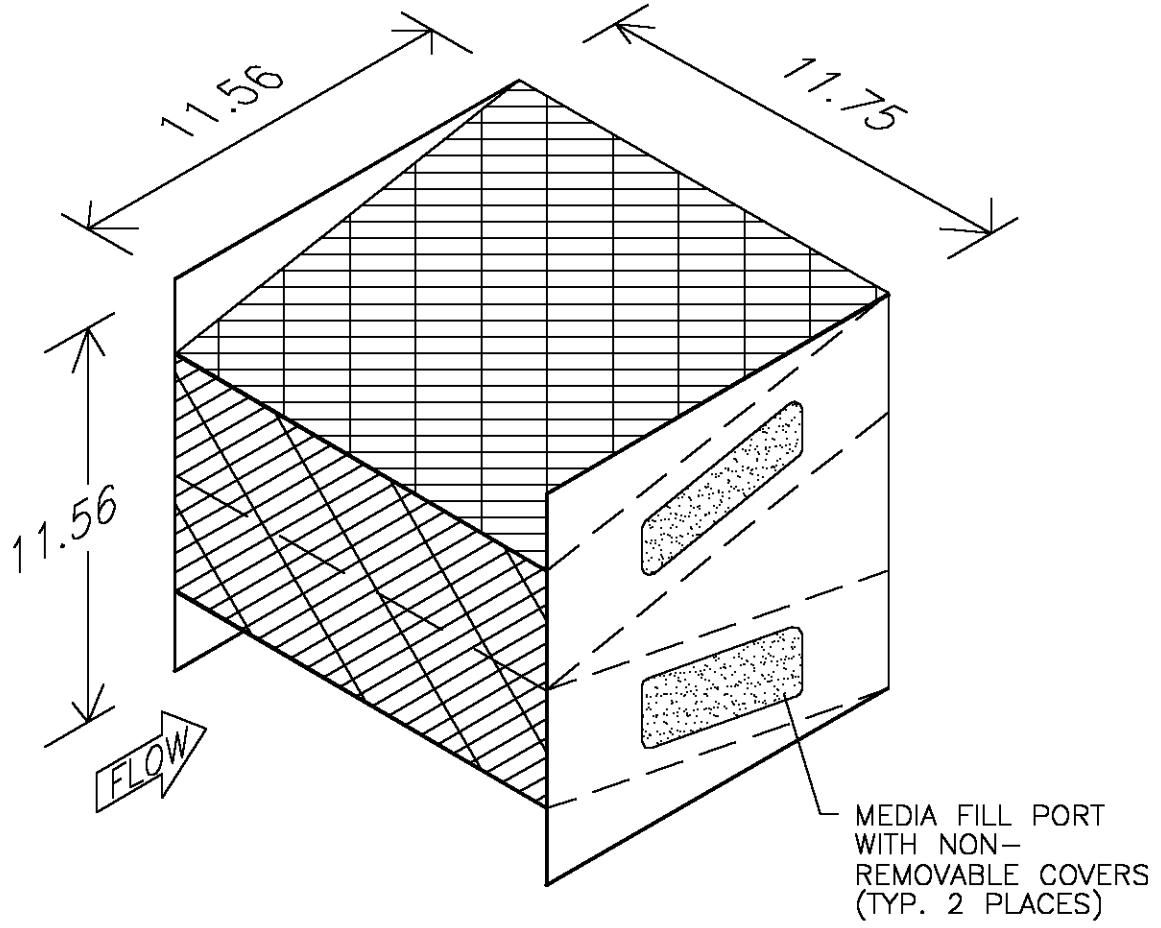
2335 NW 29th Ave. Portland, OR 97210
TEL: 800-777-4044 FAX: 503-225-0137

* HALF SIZE (11.87" W) FILTER IS RATED
for 250 CFM w/HALF AS MUCH MEDIA

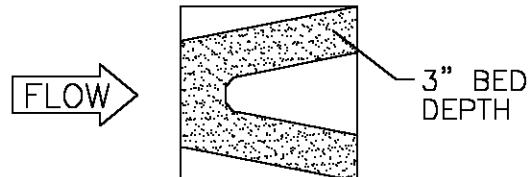
DIMENSIONS ARE FOR REFERENCE ONLY.
DO NOT USE FOR CONSTRUCTION UNLESS
MARKED "CERTIFIED" BY CGL.

| | | | | | | | |
|------|------|-----|---------------------------|-----------|--------|-------------|-----------------------------------------------------------------------------|
| B | 6/10 | JMB | Corrected filter data | DRAWN: | JMB | TITLE: | GENERAL ARRANGEMENT HALF & FULL SIZE PDM-18 PLASTIC DISPOSABLE MODULE |
| A | 5/10 | JMB | Add FULL SIZE filter data | CHECKED: | PJL | | |
| -- | 6/03 | JMB | ORIGINAL ISSUE | APPROVED: | RAH | | |
| REV. | DATE | BY | REMARKS | SCALE: | N.T.S. | DRAWING NO. | PDM-18 |

PDM-12 FILTER MODULE



| MODULE FILL MEDIA | GAC | ZK6 | BLEND |
|-----------------------------|------|------|-------|
| NO. OF FILTER BEDS | 2 | 2 | 2 |
| MAXIMUM FLOW (CFM) | 250 | 250 | 250 |
| APPROXIMATE WEIGHTS (LBS.): | | | |
| EMPTY MODULE | 3.8 | 3.8 | 3.8 |
| FILL MEDIA | 18.2 | 33.4 | 25.8 |
| TOTAL WEIGHT | 22.0 | 37.2 | 29.6 |



INTERNAL VIEW SHOWING "V" SHAPE BED ARRANGEMENT

| MATERIALS OF CONSTRUCTION |
|-----------------------------------------------------------|
| 0.100 POLYSTYRENE FRAME WITH .056 x .500 SLOTTED SCREENS. |

| | |
|---------------------------------------------|--|
| PRESSURE DROP AT 250 CFM FLOW = 1.4 IN.W.G. | |
| MODULE IS INCINERABLE | |

DIMENSIONS ARE FOR REFERENCE ONLY. DO NOT USE FOR CONSTRUCTION UNLESS MARKED "CERTIFIED" BY CGL.

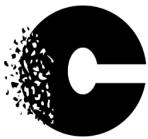
| | | | |
|---------------------------------------------------------------------------------------------|-------|-----|----------------|
| PROPRIETARY DRAWING | | | |
| DWG NOT TO BE USED OR REPRODUCED WITHOUT WRITTEN AUTHORIZATION OF CAMERON GREAT LAKES, INC. | | | |
| TOLERANCE: +/- 1/16 IN. | | | |
| REV. | DATE | BY | REMARKS |
| -- | 07/03 | JMB | ORIGINAL ISSUE |



CAMERON GREAT LAKES, INC.

2335 NW 29th Ave. Portland, OR 09210
TEL: 800-777-4044 FAX: 503-225-0137

| | | | | |
|-----------|--------|-------------------|---------------------|--|
| DRAWN: | JMB | TITLE: | GENERAL ARRANGEMENT | |
| CHECKED: | PJL | PDM-12 PLASTIC | | |
| APPROVED: | RAH | DISPOSABLE MODULE | | |
| SCALE: | N.T.S. | DRAWING NO. | PDM-12 | |



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

REFILLABLE FILTERS

FULL RETENTION V BANK One piece filter, designed to prevent bypass of contaminated air and provide high efficiency removal. The 24 x 24 x 8 cell contains 40 pounds of activated carbon and operates at a velocity of 250 FPM. Recommended for use in heavier industrial applications.

PANELS Refillable media panels. Available in sizes to fit all carbon housings. Refill on site or ship to our facility for servicing. Numerous standard sizes of reconditioned trays in stock for advancing and minimizing down time. Call to inquire as to availability.

MRM18 V-bank design with a 1" bed depth. Filter dimensions 24" wide 6" high and 18" deep. Use in CGL 20 front access housing or custom side access housings. Servicing and advancing of filters available.

MRM12 V- Bank design with a 3" bed depth, designed for use at 250 CFM in area with heavy concentrations of contaminants. Also available in a disposable filter.

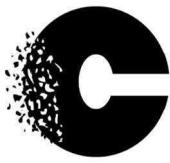
CARBON HOUSINGS

CGL 20 FRONT ACCESS HOUSING Carbon filter housing rated at 500FPM, offering high single pass efficiency. Full size 24 x 24 x 18 holds 4 MRM 18 refillable filters. Recommended in both commercial and industrial applications. Ideal where room is limited.

FRONT ACCESS 1000 Carbon filter housing rated at 250 FPM, offering high single pass efficiency. Full size 24 x 24 x 8 holds 12 carbon trays and contains 45 pounds of media. Half sizes are available. It can be installed as either front or rear access. Recommended for use in industrial applications.

FRONT ACCESS 2000 Carbon filter housing rated at 500 FPM, offering high single pass efficiency. Full size 24 x 24 x 24 holds 10 trays and contains 90 pounds of media. Half sizes are available. Recommended for use in commercial and industrial applications where heavy contaminant loads exist.

SIDE ACCESS CARBON HOUSINGS Carbon filter housing with a rated airflow of 500 FPM. Each 24 x 24 X 24 housing accommodates 10 - 1" deep trays. Trays are accessible from both sides of unit. Tracking on faces holds a 2" or 4" pre-filter. Housings to accommodate our vapor trap 12" disposable V bank can also be fabricated to accommodate any air flow.



CAMERON GREAT LAKES, INC.
MOLECULAR FILTRATION SPECIALISTS

REFILLABLE MEDIA TRAYS

Cameron Great Lakes offers carbon trays in both standard and custom sizes. The panels are designed for the easy removal of carbon media.

A variety of construction materials are available. Typical is cold rolled steel with a baked enamel finish or C.R.S. tin plated. Epoxy coated and stainless steel trays are also available.

CGL inventories a large quantity of both new and used trays, offering quick service to the end user.



TRAY SERVICE

CGL offers service of used carbon trays. Trays can be shipped to our facility for emptying and re-filling, then shipped directly back to your customer.

For those customers where system down time is critical, filters may be “advanced” for quick change-out. Using our “Tray Advance” program CGL fills the required quantity and size of trays and ships them to the site for installation. Upon installation the used trays are then returned to CGL.

This information has been gathered from standard reference materials and/or test procedures and is believed to be true and accurate. It is offered solely for your consideration and verification. None of the information presented shall be construed as constituting a warranty or representation, expressed, written, or implied, for which we assume legal responsibility or that the information of goods described is fit for any particular use either alone or in combination with other goods or processes, or that its use does not conflict with existing patent rights. No license is granted to infringe on any patent rights or practice any patent inversion.



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL- MRM18 & MRM 12 REFILLABLE MODULES

PRODUCT DESCRIPTION

The CGL-MRM18 and MRM 12 Metal Refillable modules are designed for use in both front and side access housings. The refillable design saves the end user significant cost as only the media needs to be replaced. Additionally you need not be concerned with messy on site change-outs, as your local CGL facility is prepared to empty and refill your modules. In many cases we can even advance modules for use in the system, eliminating down time.

For those who wish to change their own media, it is easily accomplished with the removal of a single end plate.



MODULE CONSTRUCTION

The module is constructed of cold rolled carbon steel black powder coated finish with 16 gauge end plates and 22 gauge perforated screens. This rigid construction ensures that the module will last through several years of service life.

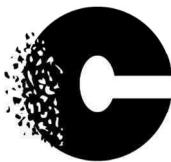
SPECIFICATIONS

MRM 18

- Each 24 x 6 x 18 inch modules is rated for 500 cfm.
- Temperature ranges up to 125 F.
- Filter bed depth 1", efficiencies greater than 90%.
- Pressure drop not to exceed 0.49 inches of water gauge at 500 ft./minute.
- Each module is designed to hold 18 pounds of CGL CP48, CCS, 36 pounds of CGL ZK6, and 24 pounds of CP48/ZK6 blended media.

MRM 12

- Each 24 x 12 x 12 inch modules is rated for 500 cfm.
- Temperature ranges up to 125 F.
- Filter bed depth 3", efficiencies greater than 95%.
- Pressure drop not to exceed 1.35 inches of water gauge at 250 ft./minute.
- Each module is designed to hold 30 pounds of CGL CP48, CCS, 60 pounds of CGL ZK6, and 45 pounds of CP48/ZK6 blended media.



CAMERON GREAT LAKES, INC.
MOLECULAR FILTRATION SPECIALISTS

CGL/FRVB FULL RETENTION V-BANK

The **CGL/FRVB** is designed to provide high efficiency contaminant removal in both commercial and industrial applications. The new design features a V-Bank configuration which prevents bypass and provides an even bed thickness. The FRVB holds approximately 40 pounds of activated carbon and may also be filled with impregnated carbons, specialty media or any combination of media depending upon your specific application. It is suitable for both front and side access installations. The FRVB filter is designed for use at a maximum air velocity of 250 fpm. Its nominal 8" depth makes it ideal for use in areas where space is limited.



Construction:

The internal panels are constructed of 24 gauge flattened diamond expanded metal, epoxy coated after fabrication. The panels are retained within a 16 gauge cold rolled steel frame which is epoxy coated after

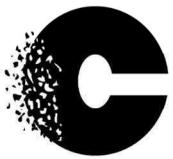
Servicing:

The FRVB is easily serviced by removal of the one piece lid. Use of your custom filling jig* makes on-site service practical. Filters may also be sent back to Cameron Great Lakes for service at our facility.

*Filling jig is available at a nominal cost

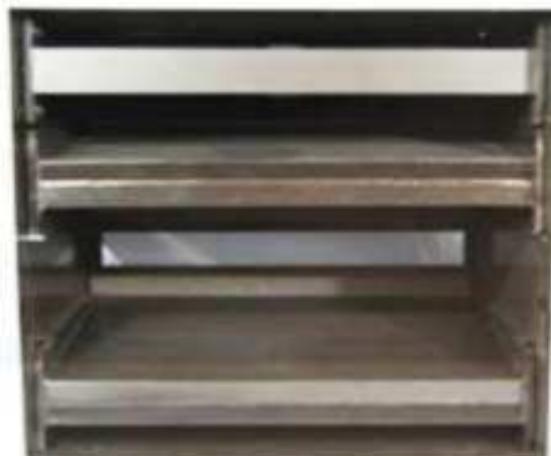
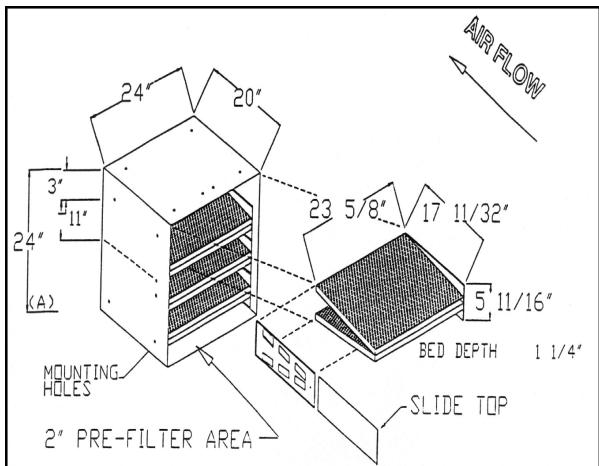
FILTER SPECIFICATIONS

| MODEL | HEIGHT (A) | WIDTH (B) | DEPTH (C) | RATED AIR FLOW | PRESSURE DROP | EMPTY WEIGHT | FILLED WEIGHT* |
|---------------------|------------|-----------|-----------|---------------------|---------------|--------------|----------------|
| FRVB FULL SIZE | 23.5" | 23.5" | 8" | 1000 cfm 250 fpm | .22" W.G. | 45 lbs. | 85 lbs. |
| FRVB-H HALF SIZE | 11.5" | 23.5" | 8" | 500 cfm 250 fpm | .22" W.G. | 24 lbs. | 44 lbs. |

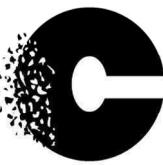


CGL/20 Front Load Housing

The CGL/20 Front Load Housing is designed for use in both commercial and industrial applications. It is used in conjunction with the CGL/MRM18 Modules and comes complete with a built in space for a 2 inch pre-filter. The single housing is rated for a maximum airflow of 2000 CFM and holds four of the MRM18 Modules. The modular design allows for built up banks to accommodate higher airflow. Its 20" depth makes it ideal for use in applications where space is limited.



| SPECIFICATIONS | WEIGHTS |
|----------------------------------------------------|----------------|
| Housing: 16 gauge CRS w/ black powder finish | 39 pounds |
| Housing with 4 MRM18 empty modules | 71 pounds |
| Housing with 4 MRM18 modules with standard carbon | 147 pounds |
| Housing with 4 MRM18 modules filled with ZK6 media | 223 pounds |



CAMERON GREAT LAKES, INC.
MOLECULAR FILTRATION SPECIALISTS

CGL - SIDE ACCESS 18

The CGL-SA18 is a rugged factory assembled housing designed to hold the MRM18 metal refillable module or PDM18 plastic disposable module in both full and half sizes. It is available with a 2" or 4" pre filter track. A post filter track of up to 12" may also be accommodated. Holding up to 70 pounds of carbon per 2000 cfm, this housing design allows for good efficiency, long life, with a shorter foot print than the standard side access tray housing. It is ideal in locations where space is limited.

HOUSING FEATURES:

- Easy access from two sides, when required.
- All metal to metal components sealed.
- Rugged construction of 16 gauge cold rolled steel, stitch welded & caulked, with an aluminized finish.*
- .48" W. G. resistance @ 500 fpm per 24" square face opening.

* This housing can be constructed of other materials and finishes, including stainless steel for corrosive applications.

CGL warrants that these units are manufactured in accordance with the specifications disclosed herein. No warranty, expressed purpose or implied, is made relating to the suitability of the product for any particular application or purpose. Do not use dimensions for construction unless drawing is marked "Certified" by CGL.



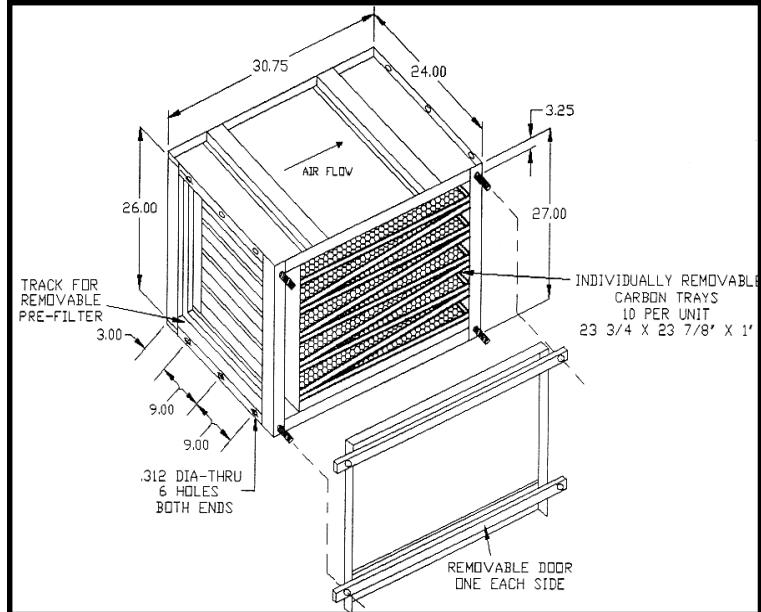
SIDE ACCESS CARBON FILTER HOUSING

This rugged factory assembled housing can be stacked to accommodate any number of carbon trays that your air flow requires. It is available with a 2" or 4" pre filter track. A final track can be added when the system design requires it. Side access housings are also available in a one piece design with both pre and post filters, including 12" deep rigid box filters.

Outward turned 1 1/2 inch flanges make installation to the duct system simple and easy.

HOUSING FEATURES:

- Easy access from two sides.
- All metal to metal components sealed.
- Rugged construction of 16 gauge cold rolled steel.
- Fully gasketed, removable or hinged doors eliminating bypass of contaminated air.
- .32" W. G. resistance @ 500 fpm per 24" square face opening.



CARBON HOUSING DIMENSIONS

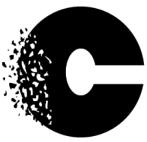
H-high W-wide Based on pre-filter actual face size 23 5/8" x 23 5/8" and ten carbon trays per one-high housing

| 1/2 H | 15" | 1 H | 27" | 1 1/2 H | 42" | 2 H | 54" |
|---------|----------|---------|----------|---------|----------|---------|----------|
| 2 1/2 H | 69" | 3 H | 81" | 3 1/2 H | 96" | 4 H | 108" |
| 1 W | 24" | 1 1/2 W | 38 1/2" | 2 W | 50 1/2" | 2 1/2 W | 62 1/2" |
| 3 W | 74 1/2" | 3 1/2 W | 86 1/2" | 4 W | 98 1/2" | 4 1/2 W | 110 1/2" |
| 5 W | 122 1/2" | 5 1/2 W | 134 1/2" | 6 W | 146 1/2" | | |

Housing depths: 2" pre-filter -30 3/4" , 4" pre-filter- 34 3/4".

Note: Add 1 1/2" to W for each door.

CGL warrants that these units are manufactured in accordance with the specifications disclosed herein. No warranty, expressed purpose or implied, is made relating to the suitability of the product for any particular application or purpose. Do not use dimensions for construction unless drawing is marked "Certified" by CGL.



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL/ ZBH — Zero Bypass Housing

Model Numbers

ZBH-SS-16 - ZBH-SS-18 - ZBH-SS-12

The ZBH housings available in 3 different depths, 12", 16" and 18". The 24" x 24" housing is rated for 1000 cfm.

The housings are constructed of 16 gauge 304 stainless steel (mild steel also available). Joints between the trays are gasketed, caulked, and covered with 20 gauge end caps to prevent bypass. The tray ends are potted (sealed) to the housing for additional prevention of bypass.

The 16" and 18" deep housings are manufactured with six, 2" deep panels. Pressure drop at the rated air flow of 1000 cfm is 1.3" of water gauge. The 16" housing holds 70 pounds of standard carbon, while the 18" housing will hold 80 pounds of standard activated carbon.

The 12" housing (11.5" actual) contains ten, 1" filter panels. Pressure drop at the rated airflow of 1000 cfm is 1.0" water gauge. The capacity is 55 pounds of standard activated carbon.

CGL offers many types of specialty activated carbon including nuclear grade carbon. Any one of these can be used in the above housings depending upon your application.

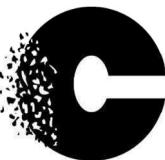
* For Mild Steel construction, change the SS in the model number to MS.

FEATURES

- Versatile, the varying depths of 12" 16" and 18" along with the different carbon capacities allows ease of for numerous different applications.
- Stainless Steel or Mild Steel* construction, depending upon your needs.
- Zero Bypass - gasketed, caulked and potted to prevent leakage
- Suitable for Bag In-Bag Out Applications.

IDEAL FOR USE IN

- *Nuclear Facilities*
- *Pharmaceuticals*
- *Laboratories*
- *Semiconductors*
- *Military Applications*



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

Installation of Media Housings and Trays

CGL20 Housings, CGL Front Access Housings

Check the area where the filters are being installed for the following:

- Ceilings are level and sides are plumb.
- Floor can support the weight of the adsorber system, when adsorbent is saturated.

Installation of Housings

Apply a thin bead of caulk around housings flanges & ductwork to prevent infiltration of moisture and contaminated air. Check to make sure the housing is oriented in the proper direction for front or rear access of servicing of trays before securing to the plenum or duct. Note that trays are installed in the housing in a horizontal position. Using the pre drilled 5/16" diameter holes on top and side, secure in place and repeat for each housing in the bank until unit is complete.

Check to make sure there is no leakage between housings and around edges of the bank that will allow contaminated air to bypass carbon bed.

Installation of Trays (CGL 20 , Front Load, and Side Access Housings)

1. Rotate trays end over end to redistribute any adsorber that may have settled during transportation to the job site.
2. Insert adsorber panel into track until end of tray is even with the service end of the housing.
3. Once all trays are installed attach one piece grid retainer to provide a proper seal.

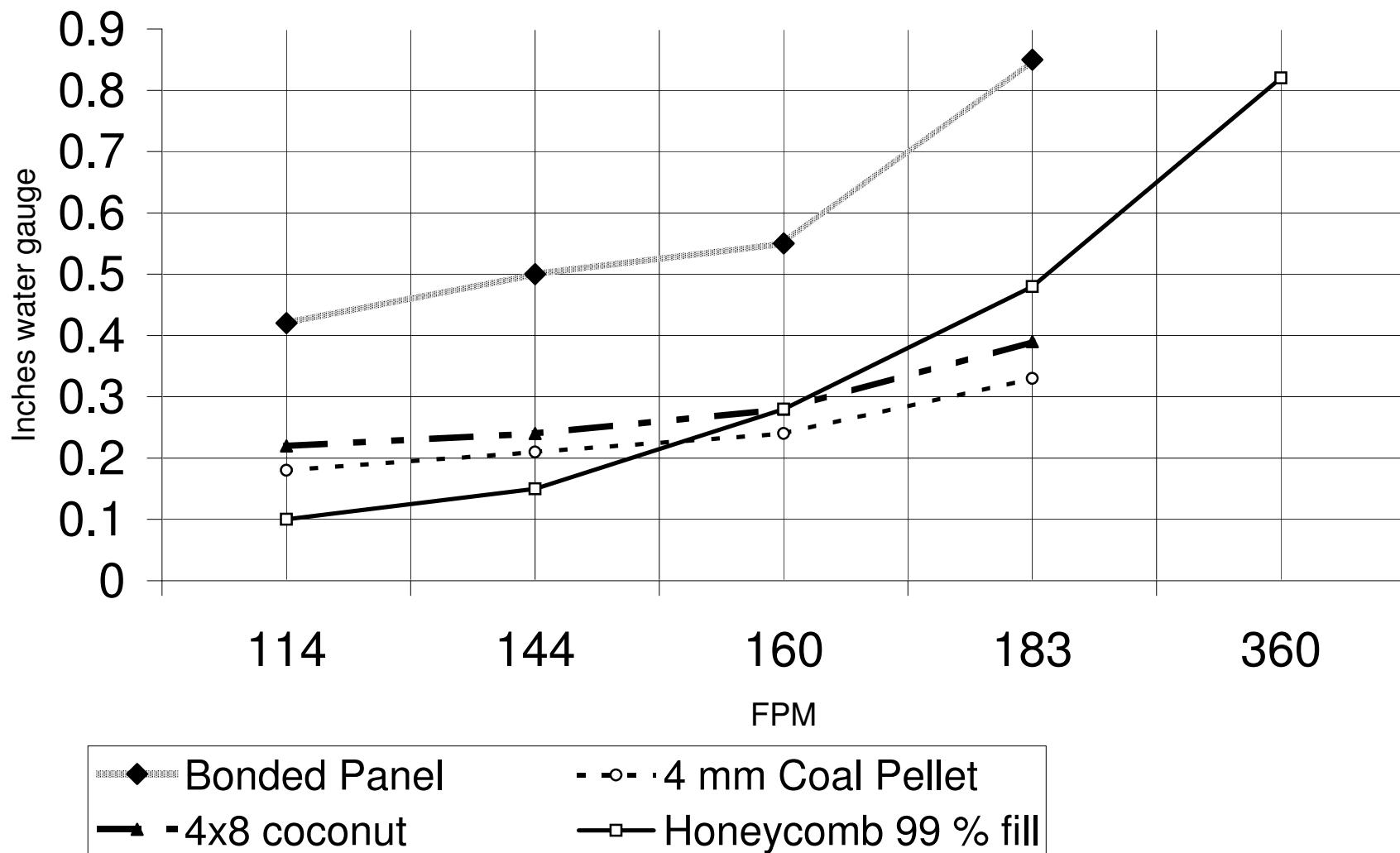
Maintenance

Call your local CGL distributor to have carbon samples tested for life remaining activity, to determine when it is time to change out the carbon in the trays. When removing carbon for testing, select a tray from the center of the system, remove tray and empty some carbon from the top, then take a 20 gram sample of carbon from the center of the tray.

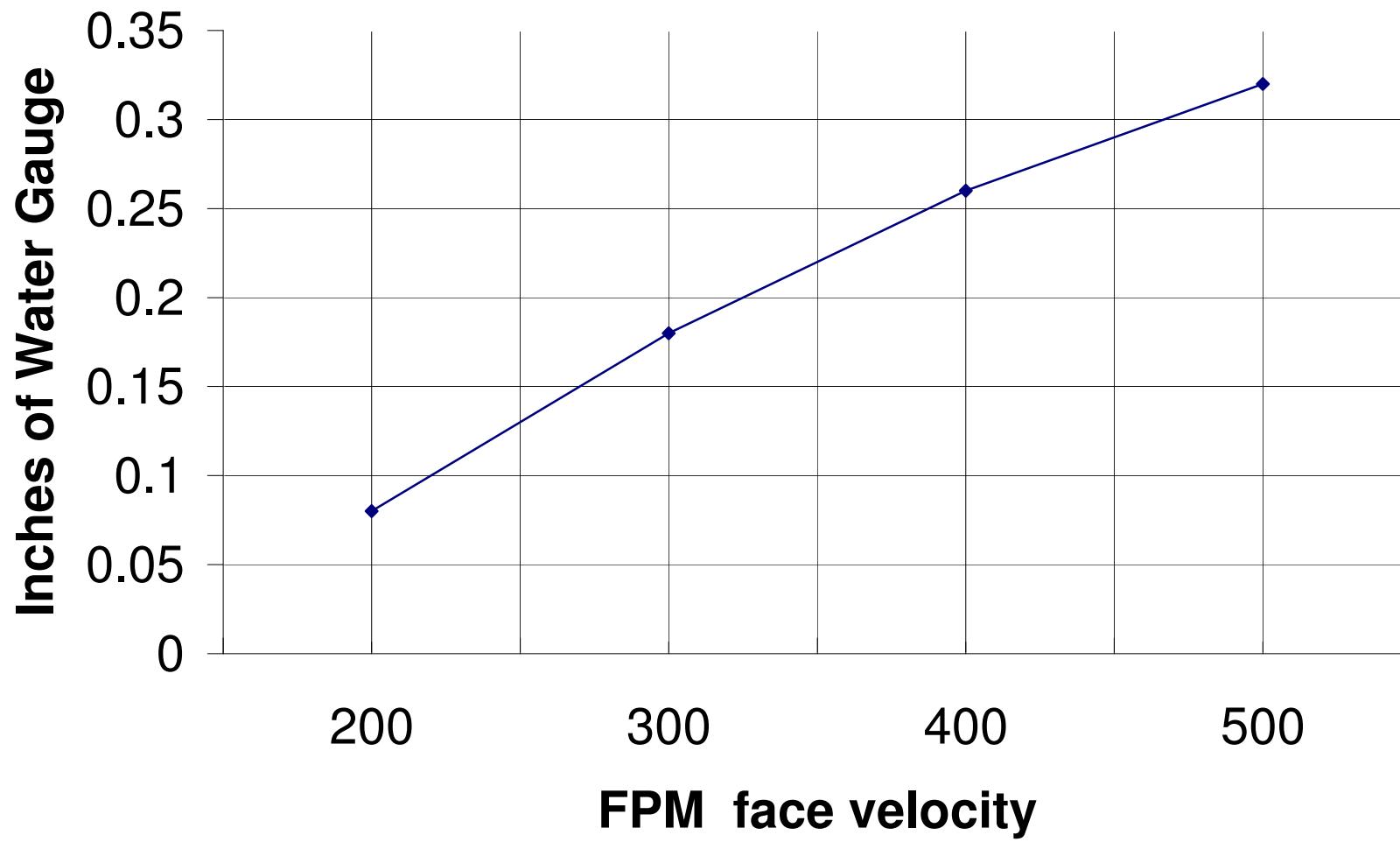
You may choose to change media on site, or you may send out to the nearest facility for service. In some cases, depending upon the filter dimension, filled trays may be advanced to the facility to minimize down time of the AHU, and existing trays are returned in exchange.

CAMERON GREAT LAKES, INC.

Pressure Drop Comparisons nominal 1" panels

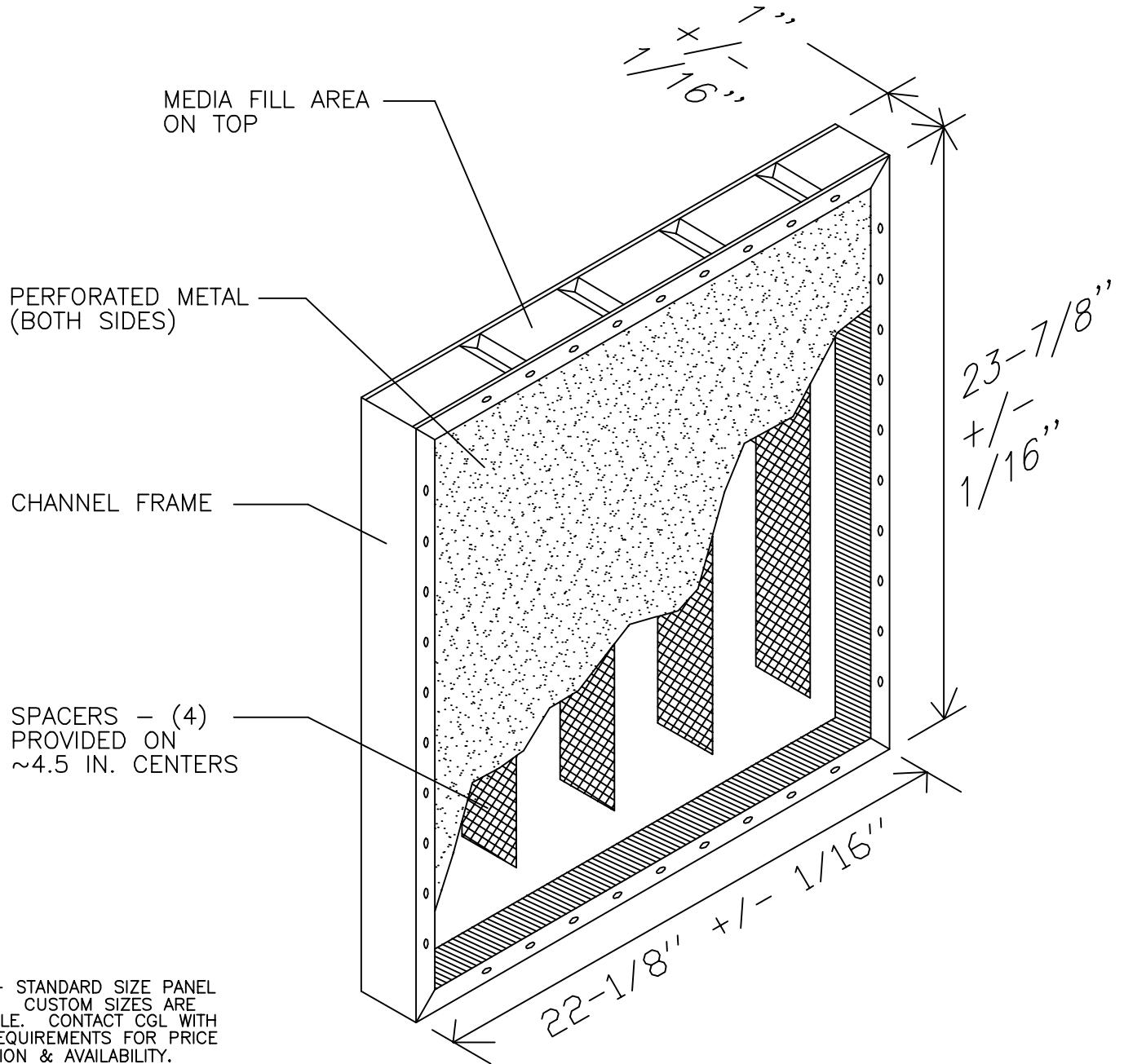


CGL Side Access Carbon Housing



SIZE 22-1/8 x 23-7/8 x 1 DEPTH PANEL

[SHOWN WITH MEDIA FILL PORT COVER REMOVED FOR CLARITY]



| PANEL FILL MEDIA | GAC | ZK6 |
|------------------|-----|-----|
| WEIGHTS (LBS.): | | |
| EMPTY MODULE | 2 | 2 |
| FILL MEDIA | 7.5 | 15 |
| TOTAL WEIGHT | 9.5 | 17 |

| MATERIALS OF CONSTRUCTION | | | |
|-----------------------------------------------------------------------------------|--|--|--|
| COLD ROLLED CARBON STEEL BLACK POWDER COATED FINISH | | | |
| 28 GAUGE FRAME & SPACERS | | | |
| 28 GA. PERFORATED SCREENS WITH 0.077" DIA. HOLES ON 7/64" STAGGERED CENTERS | | | |

PROPRIETARY DRAWING

DRAWING MAY NOT BE USED OR REPRODUCED
WITHOUT WRITTEN AUTHORIZATION OF
CAMERON GREAT LAKES, INC.

DIMENSIONAL TOLERANCE AS NOTED ABOVE



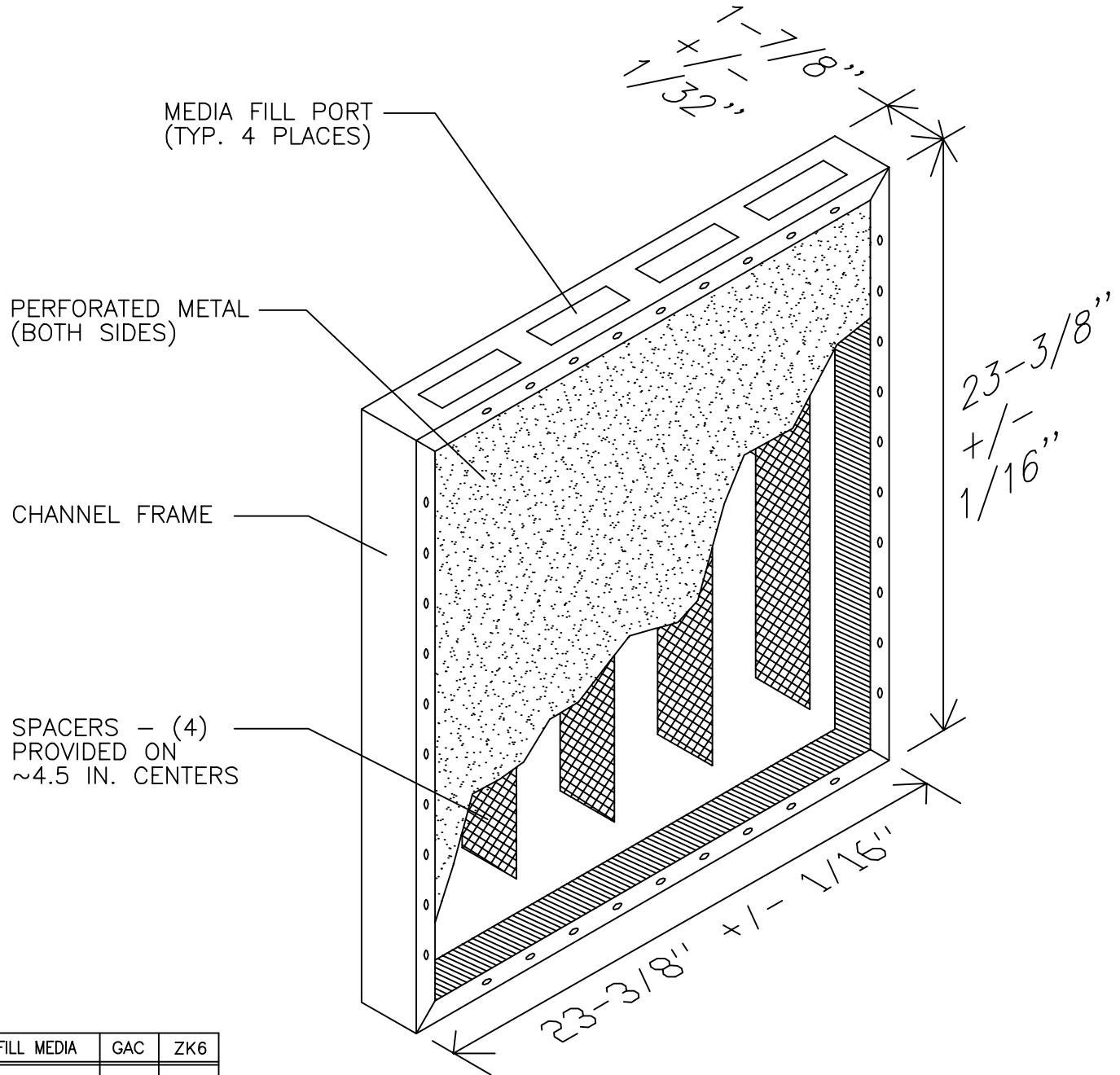
CAMERON GREAT LAKES, INC.

2335 NW 29th AVE. PORTLAND, OR 97210
TEL: 800-777-4044 FAX: 503-225-0137

| | | | |
|-----------|--------|---------|----------------------|
| DRAWN: | JMB | TITLE: | SIZE 22-1/8 x 23-7/8 |
| CHECKED: | RAH | | x 1 DEPTH METAL |
| APPROVED: | JMB | | REFILLABLE PANEL |
| SCALE: | N.T.S. | DWG NO. | 22x24x1 PANEL |
| REV. | DATE | BY | REMARKS |

SIZE 23-3/8 SQUARE x 1-7/8 DEPTH PANEL

[SHOWN WITH MEDIA FILL PORT COVER(S) REMOVED FOR CLARITY]



| PANEL FILL MEDIA | GAC | ZK6 |
|------------------|------|-----|
| WEIGHTS (LBS.): | | |
| EMPTY MODULE | 3.0 | 3 |
| FILL MEDIA | 16.5 | 30 |
| TOTAL WEIGHT | 19.5 | 33 |

MAXIMUM FLOW - 400 CFM AT
100 FPM/SQ.FT. FACE VELOCITY

MATERIALS OF CONSTRUCTION
COLD ROLLED CARBON STEEL
BLACK POWDER COATED FINISH
28 GAUGE FRAME & SPACERS
28 GA. PERFORATED SCREENS
WITH 0.077" DIA. HOLES ON
7/64" STAGGERED CENTERS

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DIMENSIONAL TOLERANCE AS NOTED ABOVE

| | | | |
|----|------|-----|---------------------|
| -- | 1/98 | JMB | CORRECTED MAX. FLOW |
| -- | 6/97 | JMB | ORIGINAL ISSUE |

| | | | |
|------|------|----|---------|
| REV. | DATE | BY | REMARKS |
|------|------|----|---------|



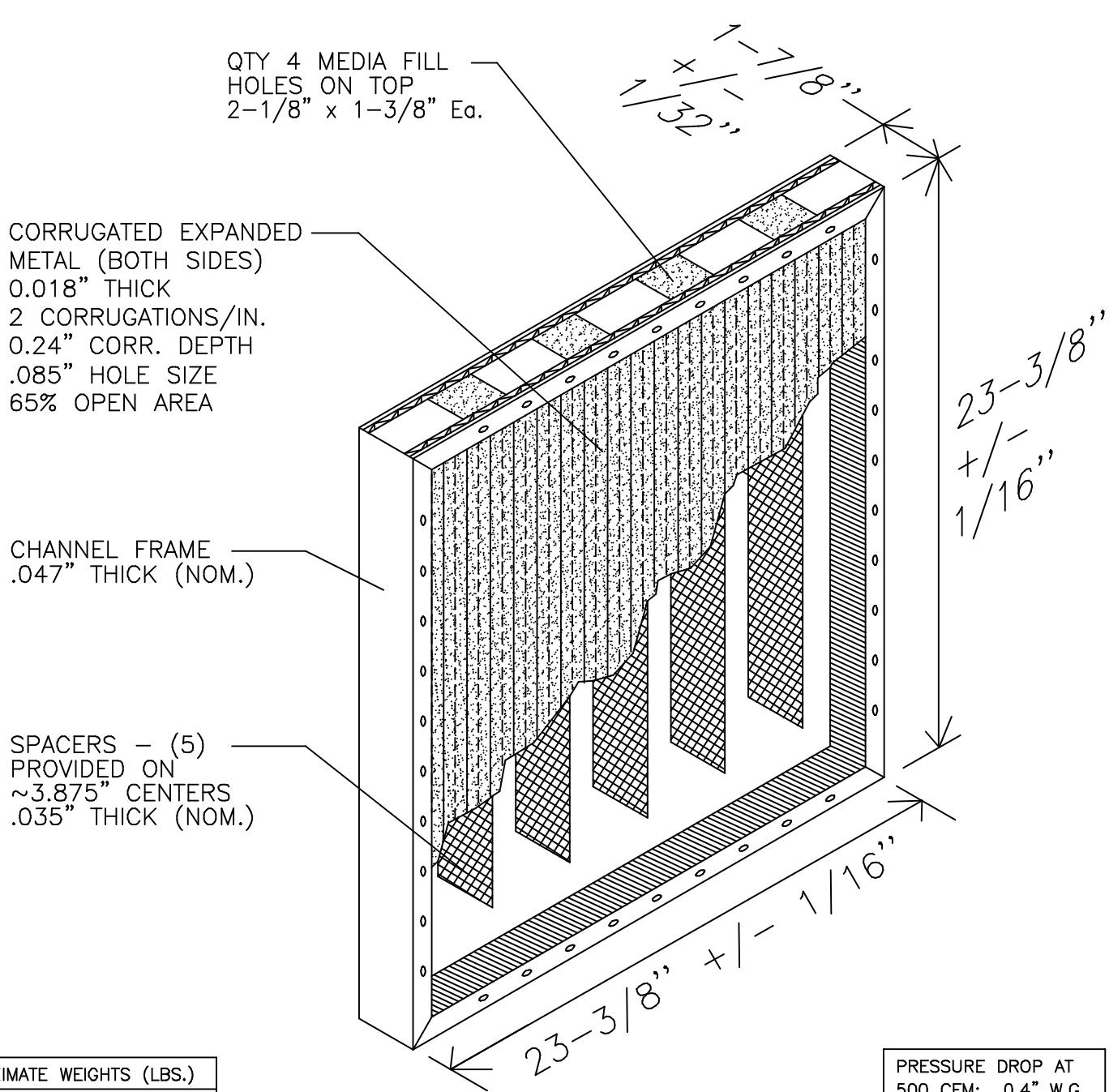
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TEL: 800-777-4044 FAX: 503-225-0137

| | | |
|-----------|--------|-------------------------------------------------------------------------|
| DRAWN: | JMB | TITLE: SIZE 23-3/8 SQUARE x 1-7/8 DEPTH METAL REFILLABLE PANEL |
| CHECKED: | PJL | |
| APPROVED: | RAH | |
| SCALE: | N.T.S. | DRAWING NO. 24x2 PANEL |

SIZE 23-3/8 x 23-3/8 x 1-7/8 TYPE "SRP" SERPENTINE REFILLABLE PANEL

[SHOWN WITH MEDIA FILL PORT COVERS REMOVED FOR CLARITY.
MEDIA FILL COVERS ATTACHED TO FRAME BY RETAINING SCREWS.]



| APPROXIMATE WEIGHTS (LBS.) | |
|----------------------------|----|
| EMPTY PANEL | 11 |
| STANDARD CARBON * | 12 |
| APPROX. TOTAL WEIGHT | 23 |

* At 30 lb/ft³ density. Media weight will vary w/impregnated carbon or ZK6 media fill.

| MATERIAL OF CONSTRUCTION | | | |
|--------------------------------------------------------|--|--|--|
| COLD ROLLED CARBON STEEL BLACK POWDER COATED FINISH | | | |

PRESSURE DROP AT
500 CFM: 0.4" W.G.

PROPRIETARY DRAWING
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CAMERON GREAT LAKES, INC.
DIMENSIONAL TOLERANCE AS NOTED ABOVE



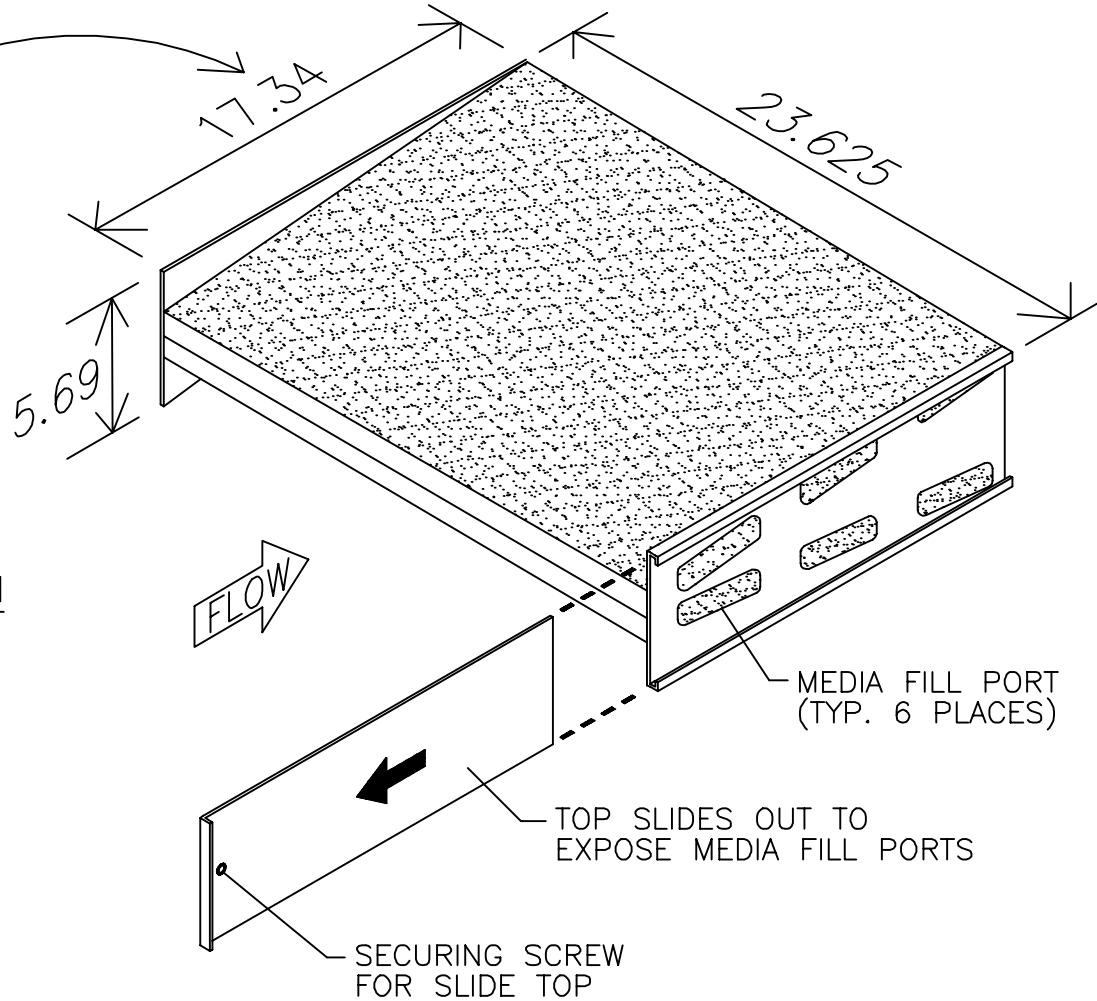
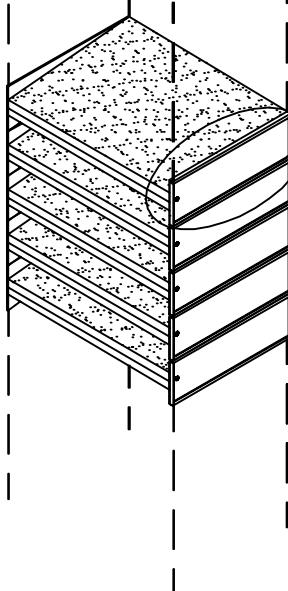
CAMERON GREAT LAKES, INC.

2335 NW 29th AVE.
PORTLAND, OR 97210 TEL. 800-777-4044
 FAX 503-225-0137

| | | | |
|-----------|--------|---------|-------------------------------------------------------------------------|
| DRAWN: | JMB | TITLE: | 23-3/8 SQ. x 1-7/8 DEPTH TYPE "SRP" - SERPENTINE REFILLABLE PANEL |
| CHECKED: | RAH | | |
| APPROVED: | JMB | | |
| SCALE: | N.T.S. | DWG NO. | 23-3/8 SQ. x 1-7/8 SRP |

-- 04/02 JMB ORIGINAL ISSUE
REV. DATE BY REMARKS

MRM18 FILTER MODULE



TYPICAL INSTALLATION

MODULES ARE ARRANGED IN A SIDE ACCESS FILTER HOUSING. NUMBER OF UNITS AS REQUIRED FOR SYSTEM DESIGN FLOW. MANY SYSTEMS INCLUDE SERIES FLOW THROUGH GRANULAR ACTIVATED CARBON (GAC) AND POTASSIUM PERMANGANATE (ZK6) FILL MEDIA.

| MODULE FILL MEDIA | GAC | ZK6 |
|--------------------|-----------|-----------|
| NO. OF FILTER BEDS | 2 | 2 |
| MAXIMUM FLOW (CFM) | 500 | 500 |
| WEIGHTS (LBS.): | | |
| EMPTY MODULE | 8 | 8 |
| FILL MEDIA | 18 | 36 |
| TOTAL WEIGHT | <u>26</u> | <u>44</u> |

| MATERIALS OF CONSTRUCTION | | |
|----------------------------|--|--|
| COLD ROLLED CARBON STEEL | | |
| BLACK POWDER COATED FINISH | | |
| 16 GAUGE END PLATES | | |
| 22 GA. PERFORATED SCREENS | | |

DIMENSIONS ARE FOR REFERENCE ONLY.
DO NOT USE FOR CONSTRUCTION UNLESS
MARKED "CERTIFIED" BY CGL.



INTERNAL VIEW SHOWING "V" BANK FILTER BED ARRANGEMENT

PROPRIETARY DRAWING
DRAWING MAY NOT BE USED OR REPRODUCED
WITHOUT WRITTEN AUTHORIZATION OF
CAMERON GREAT LAKES, INC.

TOLERANCES: LENGTH: +/- 0.125 IN.

B 05/00 JMB REVISE CORP. NAME

A 11/99 JMB REVISE FLOW & ADDRESS

-- 6/97 JMB ORIGINAL ISSUE

REV. DATE BY REMARKS



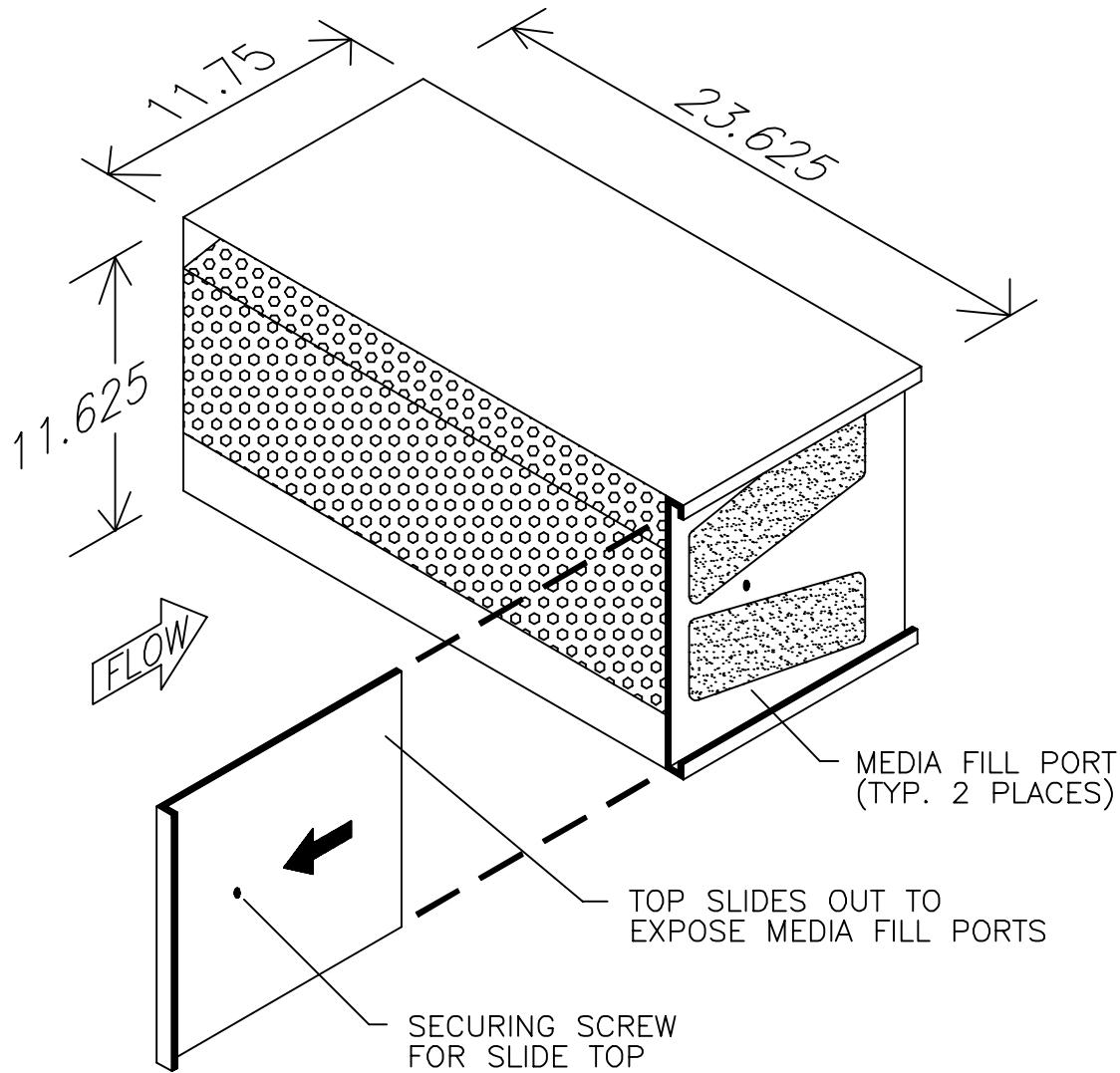
CAMERON GREAT LAKES, INC.

2335 NW 29th Ave. Portland, OR 97210
TEL: 800-777-4044 FAX: 503-225-0137

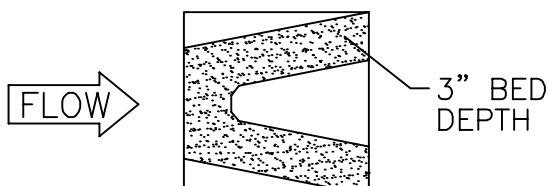
TITLE: GENERAL ARRANGEMENT
MRM18 METAL
REFILLABLE MODULE

SCALE: N.T.S. DRAWING NO. MRM18

MRM12 FILTER MODULE



| MODULE FILL MEDIA | GAC | ZK6 |
|--------------------|-----|-----|
| NO. OF FILTER BEDS | 2 | 2 |
| MAXIMUM FLOW (CFM) | 250 | 250 |
| WEIGHTS (LBS.): | | |
| EMPTY MODULE | 12 | 12 |
| FILL MEDIA | 30 | 60 |
| TOTAL WEIGHT | 42 | 72 |



INTERNAL VIEW SHOWING "V" SHAPE BED ARRANGEMENT

MATERIALS OF CONSTRUCTION

COLD ROLLED CARBON STEEL
BLACK POWDER COATED FINISH
16 GAUGE END PLATES
22 GA. PERFORATED SCREENS
(0.077" HOLES ON 7/64"
STAGGERED CENTERS)

DIMENSIONS ARE FOR REFERENCE ONLY. DO NOT USE FOR CONSTRUCTION UNLESS MARKED "CERTIFIED" BY CGL.

PROPRIETARY DRAWING

DRAWING MAY NOT BE USED OR REPRODUCED WITHOUT WRITTEN AUTHORIZATION OF CAMERON GREAT LAKES, INC.

TOLERANCES: LENGTH: +/- 0.125 IN.



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2335 NW 29th Ave. Portland, OR 97210
TEL: 800-777-4044 FAX: 503-225-0137

-- 05/00 JMB ORIGINAL ISSUE

REV. DATE BY REMARKS

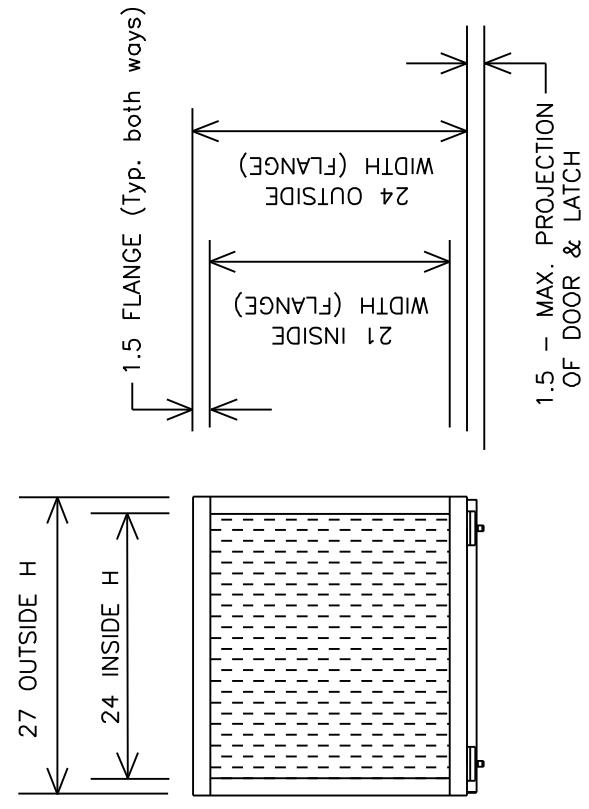
DRAWN: JMB

CHECKED: PJL

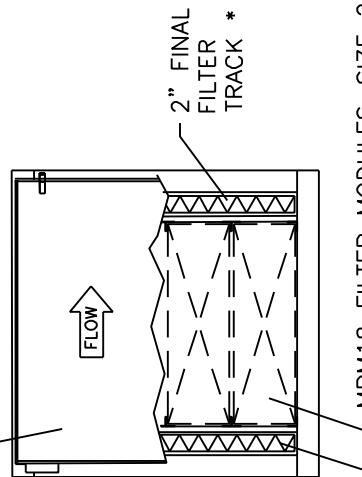
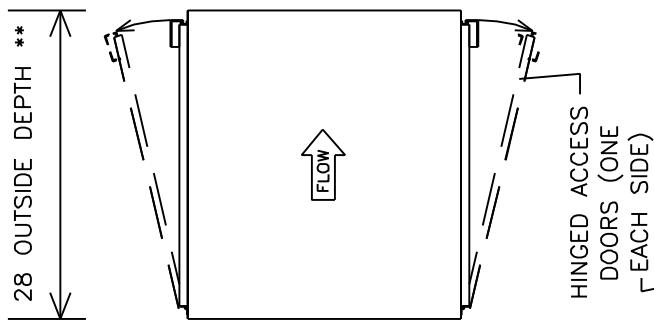
APPROVED: RAH

TITLE: GENERAL ARRANGEMENT
MRM12 METAL
REFILLABLE MODULE

SCALE: N.T.S. DRAWING NO. MRM12



END VIEW FACING OUTLET



** ADD 4" to depth for 4" depth pre & post filter panels; change model no. to SA1H1W-2P-18-4F

| PROPRIETARY DRAWING | | | |
|--------------------------------------------------------------------------------------------------|----------|-----|---------------------------------------------------|
| DRAWING MAY NOT BE USED OR REPRODUCED WITHOUT WRITTEN AUTHORIZATION OF CGL, INC. | | | |
| DIMENSIONS ARE FOR REFERENCE ONLY. DO NOT USE FOR CONSTRUCTION UNLESS MARKED "CERTIFIED" BY CGL. | | | |
| A | 04/11/11 | JMB | Add depth options for 4" pre & post filter panels |
| -- | 08/08/06 | JMB | ORIGINAL ISSUE |
| REV. | DATE | BY | REMARKS |

| MODEL NO. SA1H1W-2P-18-2F | |
|---------------------------|------------------------------|
| SA | SIDE ACCESS HOUSING |
| 1H | - 1 MODULE HIGH |
| 1W | - 1 MODULE WIDE |
| 2P | - 2 IN. DEPTH PREFILTER * |
| 18 | - MRM-18 CARBON MODULES |
| 2F | - 2 IN. DEPTH FINAL FILTER * |

4 MRM18s @ 24 LB. GAC-ZK6 BLEND
EACH = TOTAL MEDIA WEIGHT (LBS.) 96
+ 4 EMPTY 18s @ 8 LB. EACH 32
+ APPROX. EMPTY HOUSING WEIGHT 183
+ 2" DEPTH PRE & FINAL FILTERS * 4
TOTAL APPROX. OPERATING WEIGHT 315

MATERIALS - HOUSING: 16 GA. CR CARBON STEEL, STITCH WELDED & CAULKED. ALUMINIZED FINISH IS STANDARD. ENAMEL PAINT FINISH IS AN EXTRA COST OPTION.

MODULES: 16 GA. CR STEEL WITH 26 GA. PERF. SCREENS (.077" HOLES ON 7/64" STAGGERED CENTERS), BLACK POWDER FINISH

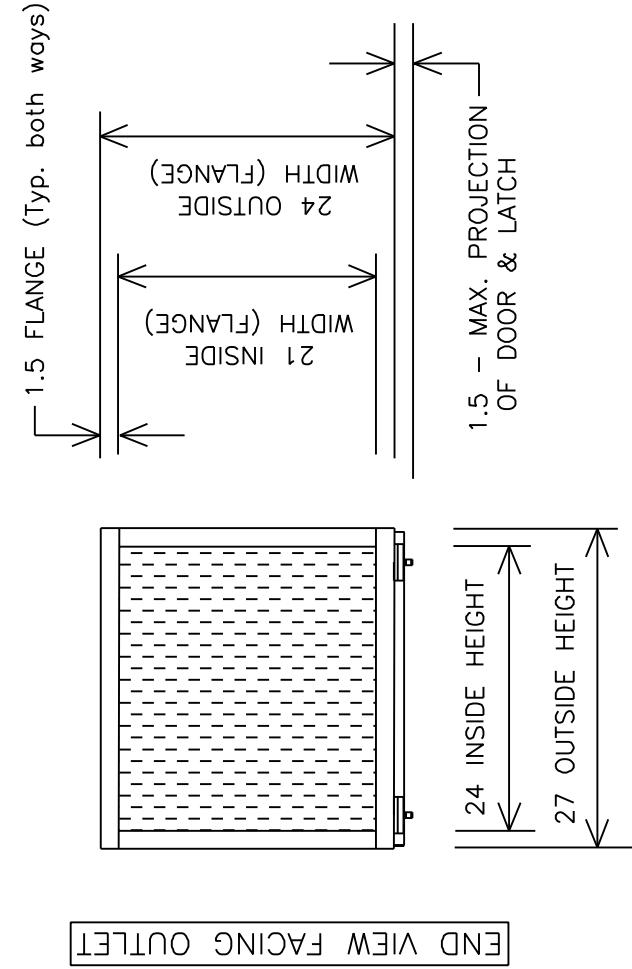
APPROX. PRESSURE DROP WITH CLEAN 2" FILTER PANELS: 1.1" W.G. AT MAXIMUM 2000 CFM AIR FLOW

CAMERON GREAT LAKES, INC.
2336 NW 29th AVE. TEL. 800-777-4044
PORTLAND, OR 97210 FAX 503-225-0137



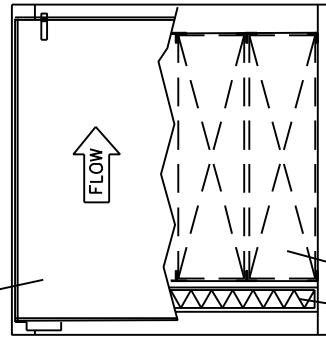
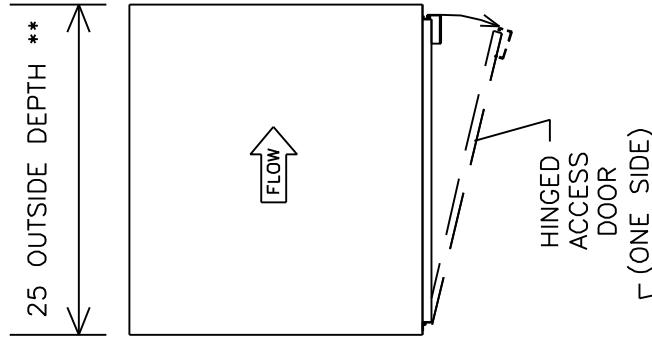
DRAWN: JMB
CHECKED: PJL
APPROVED: JMB
TITLE: GENERAL ARRANGEMENT
MODEL NO. SA1H1W-2P-18-2F
SIDE ACCESS FILTER HOUSING
SCALE: N.T.S. DWG NO. SA1H1W-2P-18-2F

** ADD 2" to depth for 4"
depth prefILTER panel;
change model number to
SA1H1W-4P-18



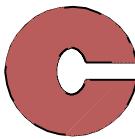
| | |
|------------------------|---------------------------|
| MODEL NO. SA1H1W-2P-18 | |
| SA | - SIDE ACCESS HOUSING |
| 1H | - 1 MODULE HIGH |
| 1W | - 1 MODULE WIDE |
| 2P | - 2 IN. DEPTH PREFILTER * |
| 18 | - MRM-18 CARBON MODULES |

4 MRM18s @ 24 LB. GAC-ZK6 BLEND
EACH = TOTAL MEDIA WEIGHT (LBS.) 96
+ 4 EMPTY 18s @ 8 LB. EACH 32
APPROX. EMPTY HOUSING WEIGHT 165
+ 2" DEPTH PREFILTER *
TOTAL APPROX. OPERATING WEIGHT 295



MATERIALS - HOUSING: 16 GA. CR CARBON STEEL WITH GREY COLOR URETHENE ENAMEL FINISH
MODULES: 16 GA. CR STEEL WITH 26 GA. PERF. SCREENS (.077") HOLES ON 7/64" STAGGERED CENTERS), BLACK POWDER FINISH

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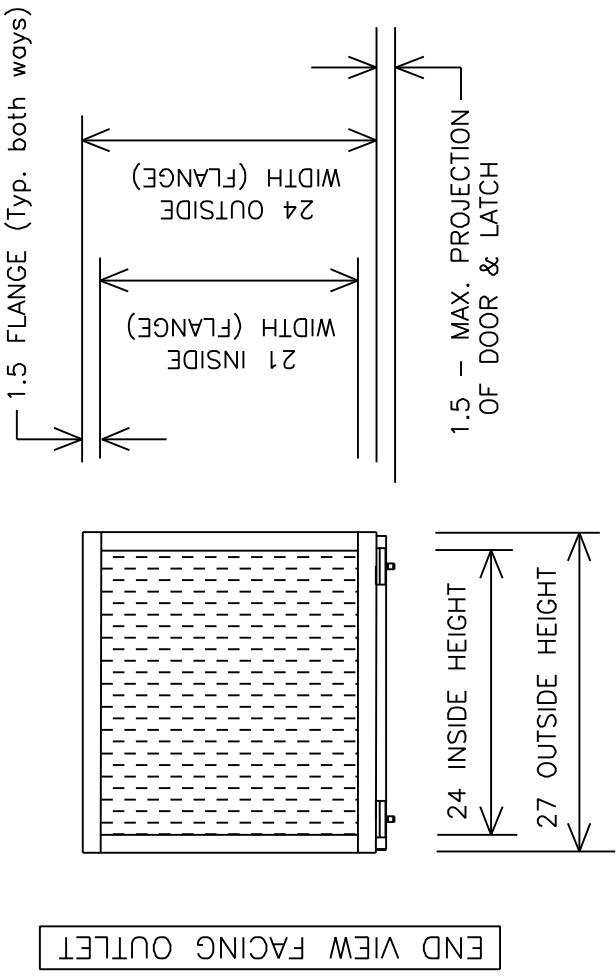


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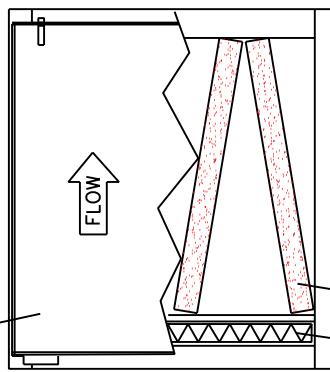
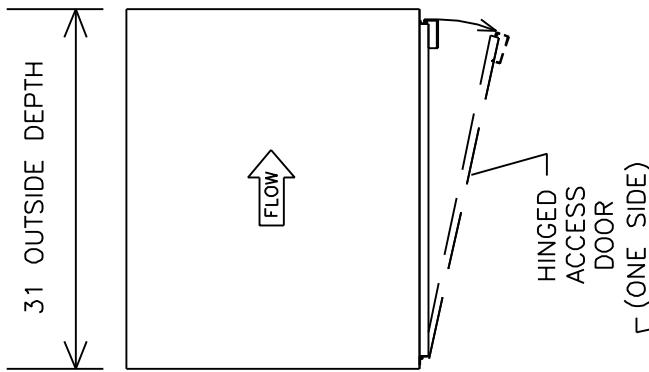
| REV. | DATE | BY | REMARKS |
|------|----------|-----|---------------------------------|
| A | 04/11/11 | JMB | Revise 4" prefILTER option note |
| -- | 02/23/04 | JMB | ORIGINAL ISSUE |

DRAWN: JMB TITLE: GENERAL ARRANGEMENT
CHECKED: PJL MODEL NO. SA1H1W-2P-18
APPROVED: JMB SIDE ACCESS FILTER HOUSING
SCALE: N.T.S. DWG NO. SA1H1W-2P-18

2000 CFM
MAXIMUM
AIR FLOW



END VIEW FACING OUTLET



"SRP" - SERPENTINE REFILLABLE PANEL.
SIZE 23.375 SQUARE x 1.875 DEPTH.
CAPACITY: 12 LBS. STD 4X8 GAC EA.

PRE-FILTER TRACK - NOMINAL
SIZE 24 x 24 x 2" DEPTH
(*) PREFILTER PROVIDED BY OTHERS

4 SRP PANELS @ 12 LB. GAC
EACH = TOTAL MEDIA WEIGHT (LBS.) 48
+ 4 EMPTY SRPs @ 11 LB. EACH 44
+ APPROX. EMPTY HOUSING WEIGHT 166
+ 2" DEPTH PREFILTER * 2
TOTAL APPROX. OPERATING WEIGHT 260

MATERIALS - HOUSING: 16 GA. CR CARBON STEEL WITH ALUMINIZED FINISH or BLACK COLOR POWDER COAT EPOXY PAINT FINISH

MODULES: 16 GA. CR STEEL WITH 26 GA. PERF. SCREENS (.077") HOLES ON 7/64" STAGGERED CENTERS), BLACK POWDER FINISH

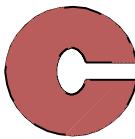
2000 CFM
MAXIMUM
AIR FLOW

PROPRIETARY DRAWING

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| | | | |
| -- | 07/27/10 | JMB | ORIGINAL ISSUE |
| REV. | DATE | BY | REMARKS |



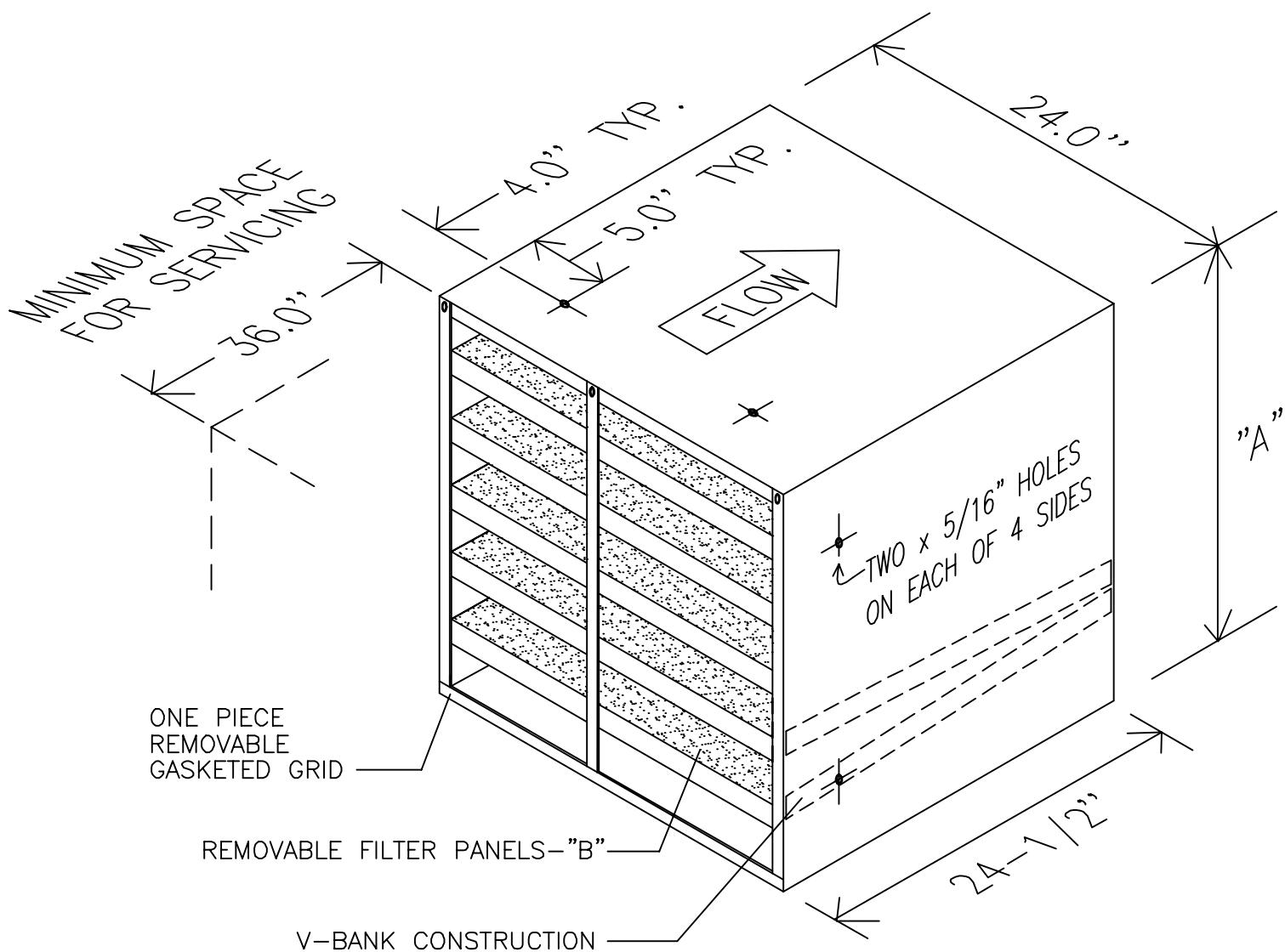
CAMERON GREAT LAKES, INC.

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PORTLAND, OR 97210 FAX 503-225-0137

DRAWN: JMB
CHECKED: PJL
APPROVED: JMB

TITLE: GENERAL ARRANGEMENT
MODEL NO. SA1H1W-2P-(4)SRP
SIDE ACCESS FILTER HOUSING
SCALE: N.T.S. DWG NO. SA1H1W-2P-(4)SRP

2000 CFM FRONT ACCESS FILTER HOUSING



| MODEL NO. | "A" | "B" | CARBON | FLOW @ 0.22" W.G. ΔP* |
|-----------|-----|-----|---------|-----------------------|
| FA-2000 | 24 | 10 | 90 lbs. | 2000 CFM* |
| FA-2000H | 12 | 5 | 45 lbs. | 1000 CFM* |

* AT 500 FPM DESIGN VELOCITY

FEATURES

- Can be installed as front or rear access
- Units bolt together to form banks of any capacity; will fit many existing holding frames.

| WEIGHTS FOR MODEL 2000-FA | | | |
|---------------------------|-----|-----|-----|
| PANEL FILL MEDIA | GAC | CI | ZK6 |
| WEIGHTS (LBS.): | | | |
| EMPTY HOUSING | 110 | 110 | 110 |
| QTY. 10 TRAYS AND MEDIA | 140 | 152 | 215 |
| TOTAL WEIGHT | 250 | 262 | 325 |

| MATERIALS OF CONSTRUCTION | | | |
|------------------------------------------------------------------------|--|--|--|
| HOUSING - 14 GAUGE COLD ROLLED CARBON STEEL BLACK POWDER COATED FINISH | | | |

| | | | |
|---------------------------------------------------------------------------------------------------|----------|-----|----------------|
| PROPRIETARY DRAWING | | | |
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| DIMENSIONAL TOLERANCE = +/- 0.030 IN. | | | |
| | | | |
| -- | 05/23/00 | JMB | ORIGINAL ISSUE |
| REV. | DATE | BY | REMARKS |



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TEL: 800-777-4044

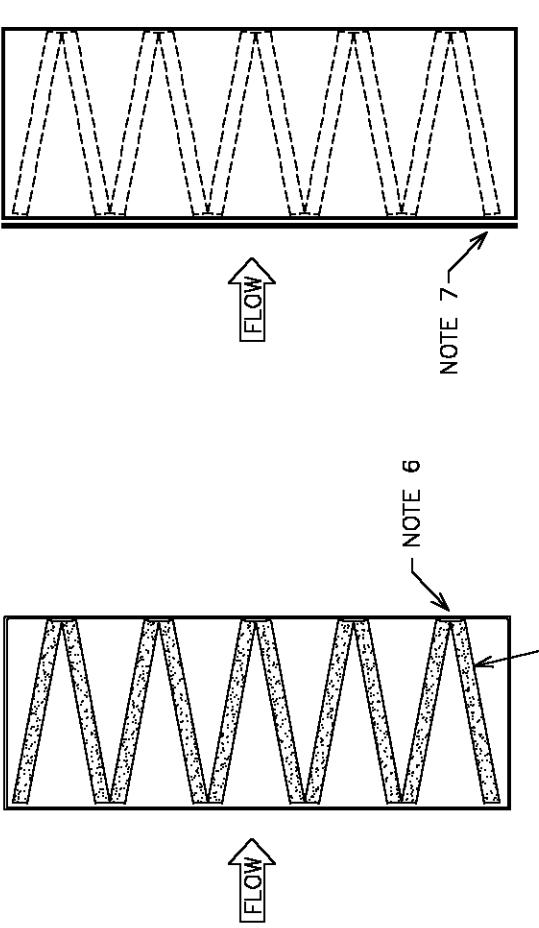
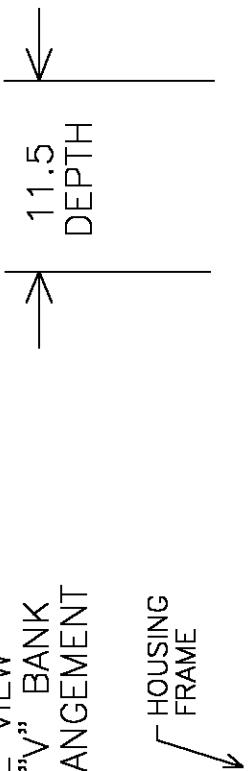
PORTLAND, OR 97210
FAX: 503-225-0137

TITLE: CGL MODEL FA-2000
FRONT ACCESS CARBON
FILTER TRAY HOUSING

SCALE: N.T.S. DWG NO. FA-2000

DRAWN: JMB
CHECKED: PJL
APPROVED: RAH

INTERNAL VIEW
SHOWING "V" BANK
PANEL ARRANGEMENT

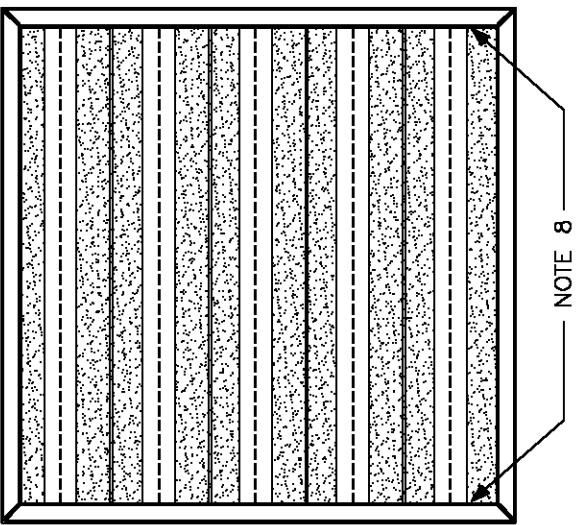


TEN (10) FILTER PANELS,
NOMINAL 1" DEPTH.
26 GAUGE FRAME WITH
26 GA. PERF. SCREENS (.045"
HOLES, 37% OPEN AREA)

- NOTES
1. MATERIAL: 304 SS, 16 GA. FRAME, 20 GA. END CAPS
 2. RATED FLOW: 1000 CFM AT 250 FPM FACE VELOCITY
 3. PRESSURE DROP AT RATED FLOW: 1.0" W.G.
 4. CARBON CAPACITY @ 100% FILL:
 - STANDARD CARBON @ 30 LB./FT³: 55 LBS.
 - IMPRregnated CARBON @ 34 LB./FT³: 60 LBS.
 - EMPTY HOUSING WEIGHT: 62 LBS. 6. JOINTS BETWEEN TRAYS ARE GASKETED, CAULKED,
 7. AND COVERED WITH END CAPS TO PREVENT BYPASS.
 7. GASKET ON UPSTREAM FACE OF FILTER:
 - 3/4" X 1/4" CLOSED CELL EDPM MATERIAL
 - 8. TRAY ENDS ARE POTTED (SEALED) TO HOUSING FRAME TO PREVENT BYPASS.
 - 9. SUITABLE FOR USE IN "BAG IN-BAG OUT" APPLICATIONS.

SIDE VIEW

RIGHT END VIEW
FACING AIR OUTLET



CAMERON GREAT LAKES, INC.

PORTLAND, OR 97210
TEL. 800-777-4044

FAX 503-225-0137
GENERAL ARRANGEMENT
MODEL ZBH-SS-12 - 304SS
ZERO BYPASS FILTER HOUSING

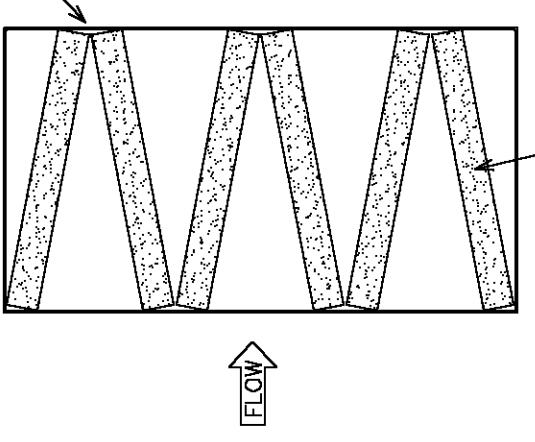
| DRAWN | JMB | TITLE | CAMERON GREAT LAKES, INC. |
|-------|-----|-------------------|---------------------------|
| | PJL | 2335 NW 29th AVE. | |
| | | TEL. 800-777-4044 | |
| | | | |

| REVISION | DATE | BY | REMARKS |
|----------|----------|-----|----------------|
| - | 02/01/00 | JMB | ORIGINAL ISSUE |

**INTERNAL VIEW
SHOWING "V" BANK
PANEL ARRANGEMENT**

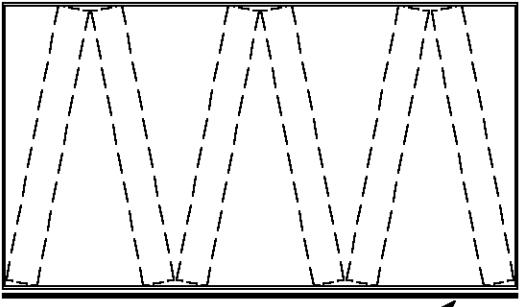
✓ **HOUSING FRAME**

← DEPTH →
16 OR 18



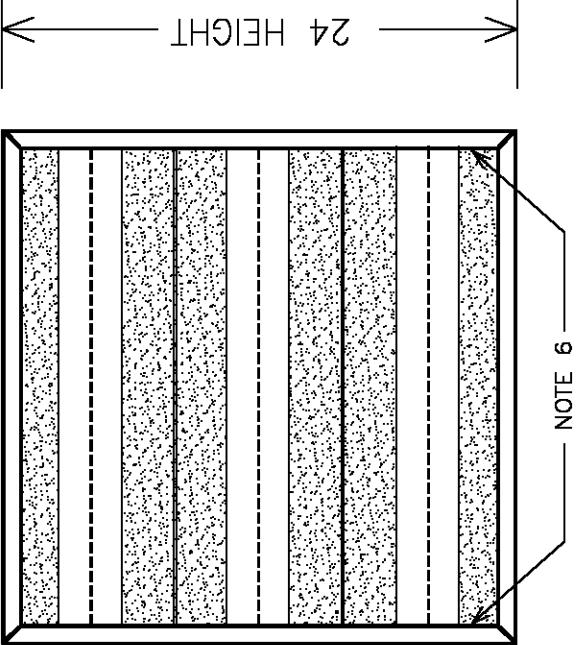
NOTES

- MATERIAL: 304 SS, 16 GA. FRAME, 20 GA. END CAPS NOMINAL 2" DEPTH.
- RATED FLOW: 1000 CFM AT 250 FPM FACE VELOCITY
- PRESSURE DROP AT RATED FLOW: 1.3" W.G.
- JOINTS BETWEEN TRAYS ARE GASKETED, CAULKED, AND COVERED WITH END CAPS TO PREVENT BYPASS.
- GASKET ON UPSTREAM FACE OF FILTER:
- 3/4" X 1/4" CLOSED CELL EDPM MATERIAL
- TRAY ENDS ARE POTTED (SEALED) TO HOUSING FRAME TO PREVENT BYPASS.
- SUITABLE FOR USE IN "BAG IN-BAG OUT" APPLICATIONS.



SIDE VIEW

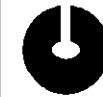
← 24 WIDTH →
→ 3/4 FLANGE (typ.)



**RIGHT END VIEW
FACING AIR OUTLET**

APPROXIMATE WEIGHTS (LBS). 16" DEPTH 18" DEPTH
EMPTY HOUSING 76 90
STANDARD CARBON @ 30 LB./FT³: 70 80
IMPREGNATED GAC @ 34 LB./FT³: 80 90

CAMERON GREAT LAKES, INC.



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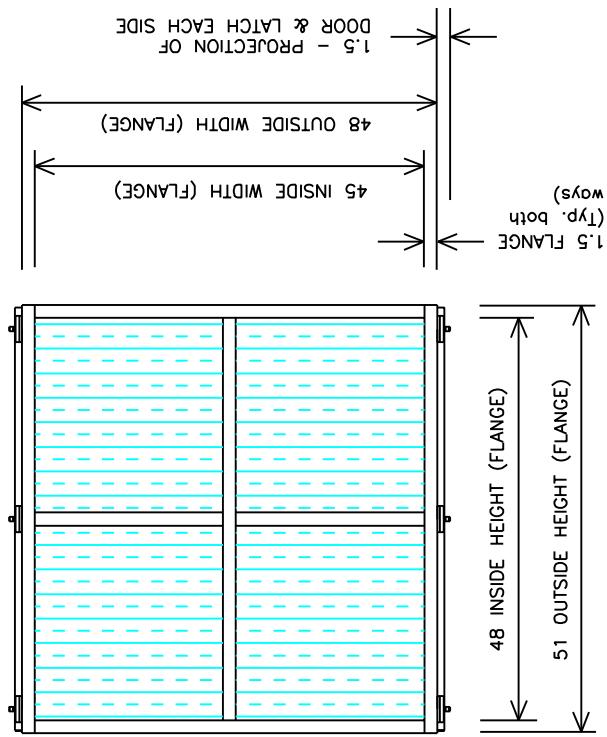
FAX 503-225-0137

| PROPRIETARY DRAWING | | DRAWN: | | APPROVED: | |
|---------------------------------------------------------------------------------------------------------|--|---------------|--|--------------------------|--|
| DRAWING NO. ZBH-SS-16 & ZBH-SS-18 TITLE: GENERAL ARRANGEMENT SUBTITLE: ZERO BYPASS FILTER HOUSING | | JMB PJL RAH | | REVISION DATE BY REMARKS | |
| | | | | | |
| | | | | | |

NOTES

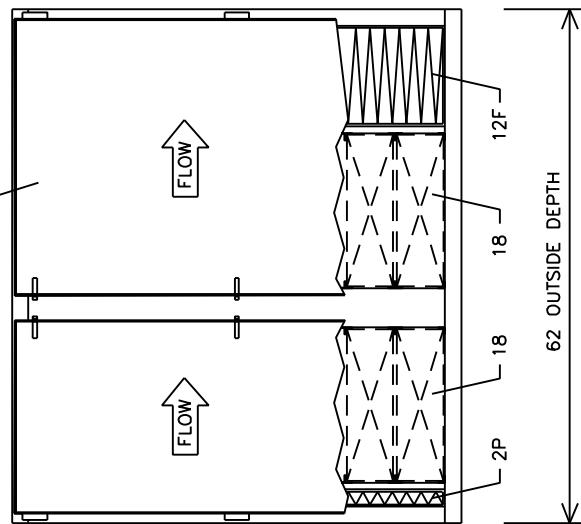
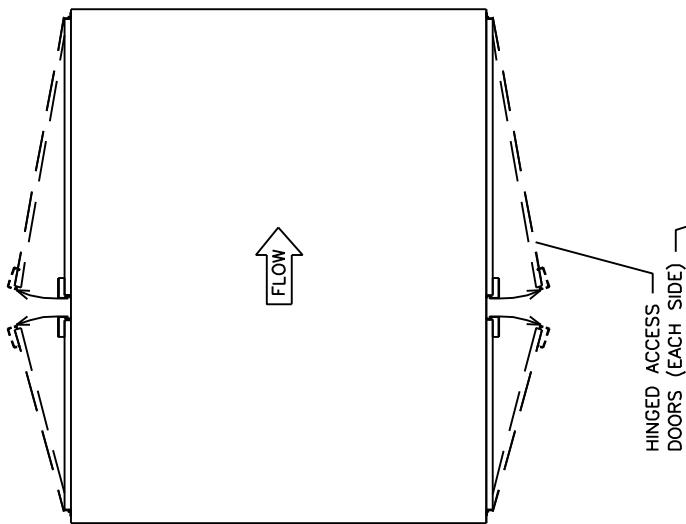
- MATERIAL: 304 SS, 16 GA. FRAME, 20 GA. END CAPS NOMINAL 2" DEPTH.
- RATED FLOW: 1000 CFM AT 250 FPM FACE VELOCITY
- PRESSURE DROP AT RATED FLOW: 1.3" W.G.
- JOINTS BETWEEN TRAYS ARE GASKETED, CAULKED, AND COVERED WITH END CAPS TO PREVENT BYPASS.
- GASKET ON UPSTREAM FACE OF FILTER:
- 3/4" X 1/4" CLOSED CELL EDPM MATERIAL
- TRAY ENDS ARE POTTED (SEALED) TO HOUSING FRAME TO PREVENT BYPASS.
- SUITABLE FOR USE IN "BAG IN-BAG OUT" APPLICATIONS.

ZBH-SS-16/18



END VIEW FACING OUTLET

| | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| MODEL NO. | SA2H2W-2P-18DP-12F |
| SA | SIDE ACCESS HOUSING |
| 2H | 2 MODULES HIGH |
| 2W | 2 MODULES WIDE |
| 2P | 2" DEPTH PREFILTERS * |
| 18 | MRM-18 CARBON MODULES |
| DP | DUAL PASS DESIGN |
| 12F | 12 IN. DEPTH FINAL FILTERS * |
| * PREFILTERS & FINAL FILTERS SUPPLIED BY OTHERS | |
| APPROX. EMPTY HOUSING WEIGHT | - 1130 LBS. |
| MATERIAL OF CONSTRUCTION: (STANDARD) STITCH WELDED & CAULKED 16 GAUGE COLD ROLLED CARBON STEEL WITH ALUMINIZED FINISH INSIDE & OUT. (OPTIONAL) PAINTED C.S. OR 304/316 STAINLESS STEEL | |

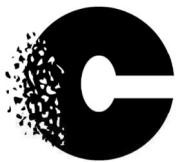


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| B | 06/27/13 | JMB | REV. TO 12" FINAL FLTR |
| A | 08/22/05 | JMB | ADD 6" FINAL FILTER |
| -- | 05/07/01 | JMB | ORIGINAL ISSUE |
| REV. | DATE | BY | REMARKS |



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TITLE: GENERAL ARRANGEMENT
MODEL SA2H2W-2P-18DP-12F
SIDE ACCESS FILTER HOUSING
SCALE: N.T.S. DWG NO. SA2H2W-2P-18DP-12F



CAMERON GREAT LAKES, INC.
MOLECULAR FILTRATION SPECIALISTS

CGL VAPOR & LIQUID PHASE EQUIPMENT

CGL offers a full line of both vapor and liquid phase adsorber vessels. The vapor phase vessels are also available in a radial flow design to accommodate higher air flow.

We can provide complete systems, including blowers and controls. In addition to all the standard vessels, CGL custom engineers systems to specifically suit your requirements.

Rental vessels for short term projects are also offered.

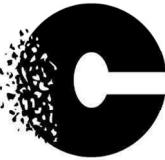


In addition to building new systems, CGL will re-bed your vessels in our IL facility for local pick up.

Vacuum services are available in house at our IL facility.

Custom reactivation of the carbon in your vessels is also available. For more information on vacuuming and reactivation services please contact us directly.





CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

VAPOR SCRUB

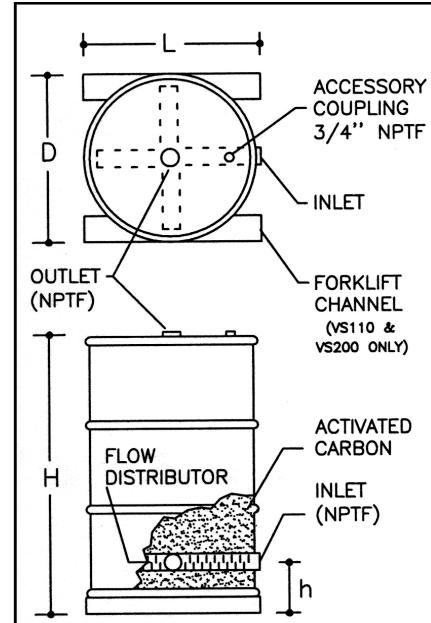
Models VS30-100 - VS55-200 - VS85-300 - VS110-400 - VS200-600

CGL Vapor Scrub units, filled with high quality Cameron/Great Lakes activated carbon, are designed for effective purification of your vapor waste or process stream. CGL **Vapor Scrub** units have a proven ability to remove organic contaminants to non-detectable levels.

CGL **Vapor Scrub** units are constructed of heavy-duty mild steel and are lined with double layered epoxy coatings. Forklift channels are provided on the VS110 & VS200 models. Adsorber internals consist of a PVC cross-style inlet flow distributor designed for complete carbon bed use. Upflow operation is standard.

For ease in process maintenance, spent carbon can be removed on site from the vessel by hand or vacuuming out by removing the vessel top head. Alternatively, the spent vessel can be shipped off site for reactivation service or disposal.

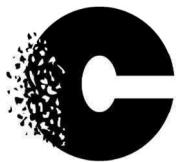
(Please contact your nearest CGL office or representative for additional information on disposal and service options.)



SPECIFICATIONS

| Model VS | 30-100 | 55-200 | 85-300 | 110-400 | 200-600 |
|--------------------------------|---------|---------|---------|----------|----------|
| H-height, in. | 30 | 36 | 40 | 46 | 51 |
| D-diameter, in. | 19 | 24 | 26 | 32 | 36 |
| L-length, in. | na | na | na | 32 | 36 |
| h-height, in. | 4.3 | 6 | 5 | 8 | 8 |
| Inlet & Outlet Connection, in. | 2 | 2 | 3 | 4 | 6 |
| Flow Range, cfm* | 60-100 | 80-150 | 110-200 | 160-300 | 210-400 |
| Pressure Drop Range, in.w.g. | 2.3-6.8 | 2.7-8.0 | 3.0-9.0 | 3.4-10.3 | 3.0-10.0 |
| Max Pressure, psig | 8 | 8 | 8 | 8 | 8 |
| Max Temp, deg. F | 125 | 125 | 125 | 125 | 125 |
| Carbon Capacity Weight, lbs. | 100 | 200 | 300 | 400 | 600 |
| Volume, cu. ft. | 3.9 | 7.1 | 10.0 | 16.1 | 20 |
| Shipping Weights, lbs | 150 | 270 | 380 | 640 | 1000 |

* Based on face velocity range of 30 to 55 fpm/sq. ft. bed area. System design may be dictated by chemistry and residence times.



VAPOR SCRUB “MI” Adsorbers with *Metal Internals*
Models VS30-80MI - VS55-160MI - VS85-250MI - VS110-325MI

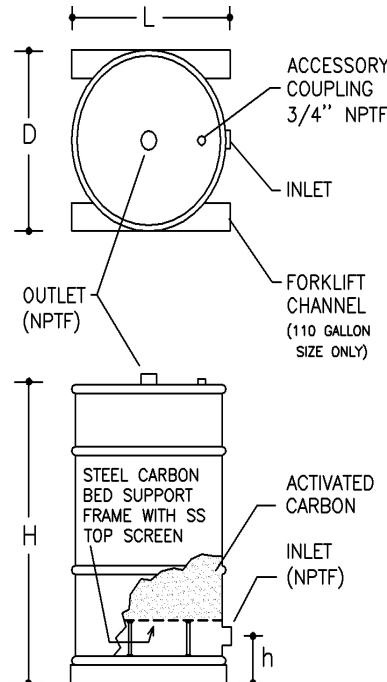
CGL Vapor Scrub MI units, filled with high quality Cameron Great Lakes activated carbon, are designed for effective purification of your vapor waste or process stream. CGL **Vapor Scrub MI** units have a proven ability to remove organic contaminants to non-detectable levels.

CGL Vapor Scrub MI units are constructed of heavy-duty mild steel and are lined with doubled layered epoxy coatings. Forklift channels are provided on VS-110MI models. Adsorber internals consist of a rugged steel carbon bed support frame and a field replaceable stainless steel top screen. Upflow operation is standard.

For ease in maintenance, spent carbon can be removed on site by hand or vacuuming out by removing the vessel top head. Alternatively, the spent vessel can be shipped off site for reactivation service or disposal. (*Please contact your nearest CGL office or representative for additional information on disposal and service options.*)

SPECIFICATIONS - “MI” ADSORBERS

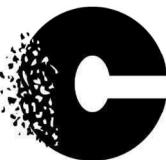
| Model VS | 30-80 | 55-160 | 85-250 | 110-325 |
|-------------------------------------------|---------|---------|---------|----------|
| H - height, in. | 30 | 36 | 40 | 46 |
| D - diameter, in. | 19 | 24 | 26 | 32 |
| L - length, in. | na | na | na | 32 |
| h - height, in. | 4.3 | 6 | 5 | 8 |
| Inlet & Outlet Connection, in. | 2 | 2 | 3 | 4 |
| Flow Range, cfm* | 60-100 | 80-150 | 110-200 | 160-300 |
| Pressure Drop Range, in. w.g. | 2.3-6.8 | 2.7-8.0 | 3.0-9.0 | 3.4-10.3 |
| Max Pressure, psig | 8 | 8 | 8 | 8 |
| Max Temp, deg. F ** | 250 | 250 | 250 | 250 |
| Carbon Capacity, lbs. + | 80 | 160 | 250 | 325 |
| Carbon Volume, cu. ft. | 3.9 | 7.1 | 10.0 | 16.1 |
| Shipping Weight, lbs. | 130 | 230 | 330 | 560 |



* Based on face velocity range of 30 to 55 fpm/sq. ft. bed area. System design may be dictated by inlet chemistry and required residence time.

** “MI” Units with metal internals can *physically* withstand a maximum inlet air temp of 250°F. However, the adsorption capacity of activated carbon decreases significantly at operating temperatures over 125°F.

+ Carbon capacity for standard carbon at 30 lb/cu.ft. density. Add 14% to media weight for Type “CI” (*caustic impregnated*) carbon. Contact CGL for engineering assistance for applications requiring other types of media or media blends.



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

VAPOR SCRUB RADIAL FLOW UNITS

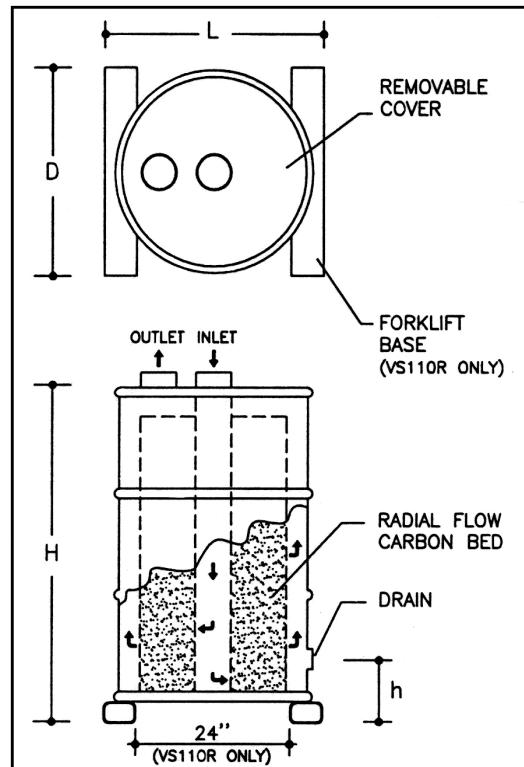
Models VS55-165R VS85-270R VS110-400R VS110-300R

CGL Vapor Scrub Radial Flow units are designed for effective purification of your vapor waste or process stream. The shallow depth carbon bed in this radial design allows processing of high air flows at low pressure drop. CGL **Vapor Scrub Radial** units are constructed of heavy-duty mild steel and are lined with double layered epoxy coatings. Forklift base is provided on the VS110R models only (base tubes can be “clipped” for trailer mounting as a price option). Adsorber internals consist of an inlet distributor tube/retention screens and outer screen with spacers to the vessel shell.

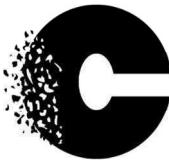
Untreated vapors enter the inlet distributor tube and proceed horizontally through the carbon bed and outer screen to the free air space inside the vessel wall. The purified air then travels to the upper collection area and exits through the outlet port. For ease in process maintenance, spent carbon can be removed on site from the vessel by hand or vacuuming out by removing the vessel top head. Alternatively, the spent vessel can be shipped off site for reactivation service or disposal.

SPECIFICATIONS

| Model VS | 55-165R | 85-270R | 110-400R | 110-300R |
|------------------------------------------|---------|---------|----------|----------|
| H - height, in. | 30 | 36 | 46 | 46 |
| D - diameter, in. | 19 | 24 | 32 | 32 |
| L - length, in. | na | na | 36 | 36 |
| h - height, in. | 4.3 | 6 | 10 | 10 |
| Inlet & Outlet Duct Connection, in. dia. | 4 | 4 | 4 | 6 |
| Flow Range, cfm* | 100-300 | 120-360 | 167-500 | 200-600 |
| Pressure Drop Range, in. w.g. | 1.2-6.0 | 1.1-5.6 | 1.2-6.0 | 1.0-5.0 |
| Max Pressure, psig | 8 | 8 | 8 | 8 |
| Max Temp, deg. F | 125 | 125 | 125 | 125 |
| Carbon Capacity Weight, lbs. | 165 | 270 | 400 | 300 |
| Volume, cu. ft. | 5.5 | 9.0 | 16.67 | 10.0 |
| Shipping Weight, bs. | 220 | 340 | 740 | 540 |



* Based on face velocity range of 33 to 100 fpm/sq.ft. bed area. System design may be dictated by chemistry and residence time.



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

VAPOR SCRUB RADIAL FLOW UNITS

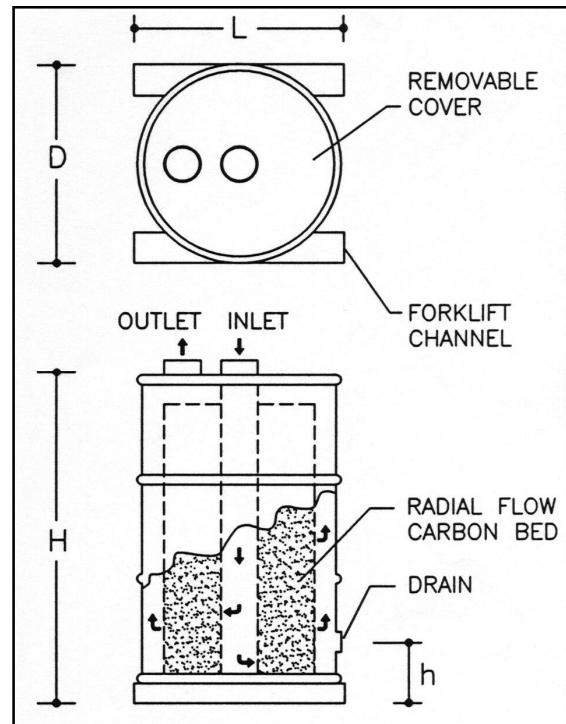
Models VS500-1500R VS1000-4500R VS1600-3000R

CGL Vapor Scrub Radial Flow units are designed for effective purification of your vapor waste or process stream. The shallow depth carbon bed in this radial design allows processing of high air flows at low pressure drop. CGL **Vapor Scrub Radial** units are constructed of heavy-duty mild steel and have internal epoxy paint and exterior enamel paint. A steel base is provided for ease of handling using a forklift or pallet truck. Adsorber internals consist of a painted steel inlet distributor tube with galvanized steel retention screen and outer galvanized steel screen with PVC spacers to the vessel shell.

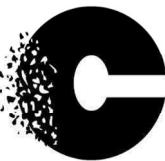
Untreated vapors enter the inlet distributor tube and proceed horizontally through the carbon bed and outer screen to the free air space inside the vessel wall. The purified air then travels to the upper collection area and exits through the outlet port. For ease in process maintenance, spent carbon can be removed on site from the vessel by hand or vacuuming out by removing the vessel top head. Alternatively, the spent vessel can be shipped off site for reactivation service or disposal.

Please contact your nearest CGL office or representative for additional information on disposal and service options.

| SPECIFICATIONS | | | |
|------------------------------------------|-----------|------------|------------|
| Model VS | 500-1500R | 1000-4500R | 1600-3000R |
| H - height, in. | 47 | 77 | 77 |
| D - diameter, in. | 38 | 49 | 49 |
| L - length, in. | 40 | 50 | 50 |
| h - height, in. | 7 | 7 | 7 |
| Inlet & Outlet Duct Connection, in. dia. | 10 | 12 | 12 |
| Flow Range, cfm* | 500-1500 | 1500-4500 | 1000-3000 |
| Pressure Drop Range, in w.g. | 1.0 - 5.0 | 2.0 - 8.0 | 1.8 - 8.0 |
| Max Pressure, psig | 6 | 6 | 6 |
| Max Temp, deg. F | 125 | 125 | 125 |
| Carbon Capacity Weight, lbs. | 500 | 1000 | 1600 |
| Volume, cu. ft. | 17.5 | 35 | 56 |
| Shipping Weight, lbs. | 850 | 1650 | 2150 |



* Based on face velocity range of 33 to 100 fpm/sq.ft. bed area. System design may be dictated by chemistry and residence time.



CAMERON GREAT LAKES, INC.

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VAPOR SCRUB - MODEL VS330LP-P

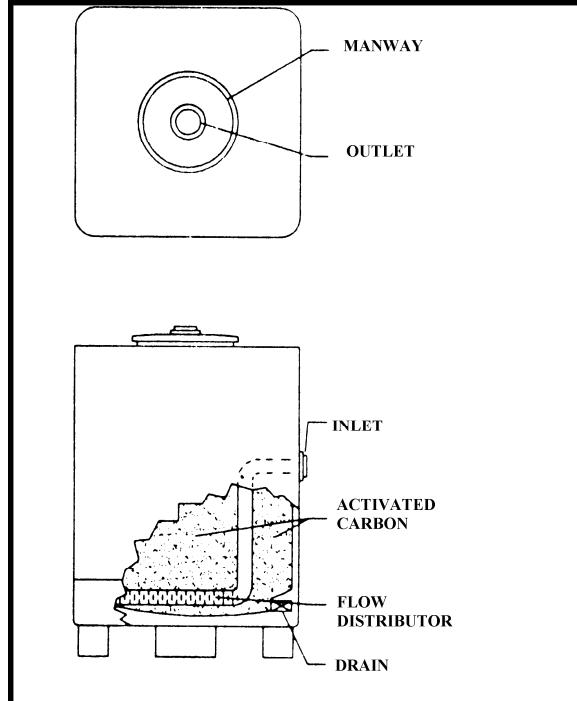
The VAPOR SCRUB Model VS330LP-P, filled with high quality Cameron Great Lakes activated carbon, is designed for effective purification of your vapor stream. The VS330LP-P has the proven ability to remove organic contaminants to non-detectable levels.

The VS330LP-P features a rotationally molded polyethylene (PE) tank with a minimum 1/2" wall thickness for added strength and corrosion resistance. The VS330LP-P features a square base with four-way forklift and two-way pallet jack access. The VS330LP-P container is UN31 rated for shipment of hazardous materials. Adsorber internals consist of a PVC distributor designed for even air distribution across the bottom of the vessel and complete carbon bed use. Upflow operation is standard.

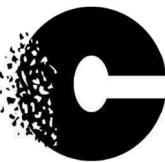
For ease in process maintenance, spent carbon can be removed on site from the vessel by vacuuming out or manual removal through the top 18" manway. (An optional 8" dia. Bottom-sided-mounted gate valve is available to simplify manual removal of spent carbon.) Alternatively, the spent vessel can be shipped off site for reactivation service or disposal. *Please contact your nearest CGL office or representative for additional information on disposal and service options.*

SPECIFICATIONS

| | | |
|------------------------------------------|--------|----------|
| Inlet/Outlet, FNPT, (in) | 4 | 6 |
| Manway, (in. dia.) | 8 | 18 |
| Liquid Drain Valve, (in) | 1 | 1 |
| Height, (in) | 66 | 67 |
| Base, (in) | 45 1/2 | x 45 1/2 |
| Max Flow, (cfm) | 400 | 1000 |
| Max Inlet Pressure, (psig) | 3 | 3 |
| Pressure drop at max flow, (in. w.g.) | 5 | 8 |
| Max Temp, (deg. F) | 120 | 120 |
| Carbon Capacity | | |
| Weight, (lbs) | 1000 | 1000 |
| Volume, (cu. Ft.) | 34 | 34 |
| Shipping Weight, (lbs) | 1300 | 1300 |



Cameron Great Lakes, Inc has a policy of continuous research, development and product improvement and reserves the right to change design and specifications without notice. No warranty, expressed or implied, is made relating to the suitability of the product for a particular purpose or application.



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

VAPOR SCRUB HIGH PRESSURE STEEL FILTER VESSELS

CONSTRUCTION

Vapor Scrub high pressure rated filter vessels are electric welded, low carbon steel constructed. Standard vessels are designed for 100 PSIG working pressure and factory tested. The vessels are either lined with 6 mils DFT phenolic epoxy and the exterior coated with a rust inhibiting primer and top coat or hot dip galvanized. Vessels with a 30 inch diameter and less have two 4 x 6 inch hand holes in the top head and lower side shell. Tanks with a 36 inch to 60 inch diameter have an 11 x 15 manway in the top head and a 4 x 6 inch hand hole in the lower side shell. Tanks with a 66 inch diameter and larger have two 11 x 15 inch manways, one in the top head and one in the lower side shell. Standard connections are NPT threaded full couplings.

OPTIONAL: ASME CODE pressure vessels are fabricated and stamped in accordance with ASME code, Sec. 8, Div. 1. Vessels are available with Canadian Registration Numbers (CRN), special pressure ratings, connections, relief valves, various openings and interior and exterior coatings. Vessels are furnished with flanged connections when required.

FILTRATION MEDIA

ACTIVATED CARBON: Standard activated carbon is size 4 x 8 mesh, 60% CTC activity, 950 minimum iodine number and a minimum abrasion number of 95. Additional grades and specialty carbons are available.

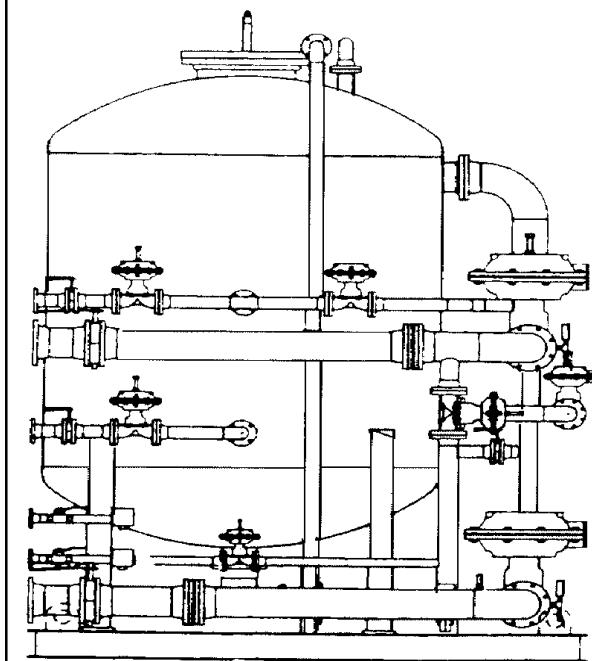
ODOR OXIDIZING MEDIA: This filtration media starts with a aluminosilicate base material possessing significant molecular sieve sorption capacity impregnated with 6% by weight potassium permanganate.
(Please request CGL / ZK6 Product Bulletin for additional information.)

DISTRIBUTOR SYSTEM

Standard vessel design is air "up flow". Standard bottom diffuser is a hub & lateral design using PVC materials. All metal internals available as an option for severe service or for on-site steam desorption.

OPTIONS AND ACCESSORIES

- A. Flanged or threaded connections.
- B. Linings: Rubber, epoxy, galvanizing, fiberglass.
- C. Number, size, and location of manways, handholes, fittings; structural legs; skid or flat base.
- D. Valves, sample taps, skid mounting, and controls.
- E. Vessel pressure ratings and certifications: ASME, National Board, Military, CRN
- F. Various grades and mesh sizes or media.
- G. Additional diameters and sideshell lengths.
- H. Special materials & alloys; design for on-site desorption using steam.



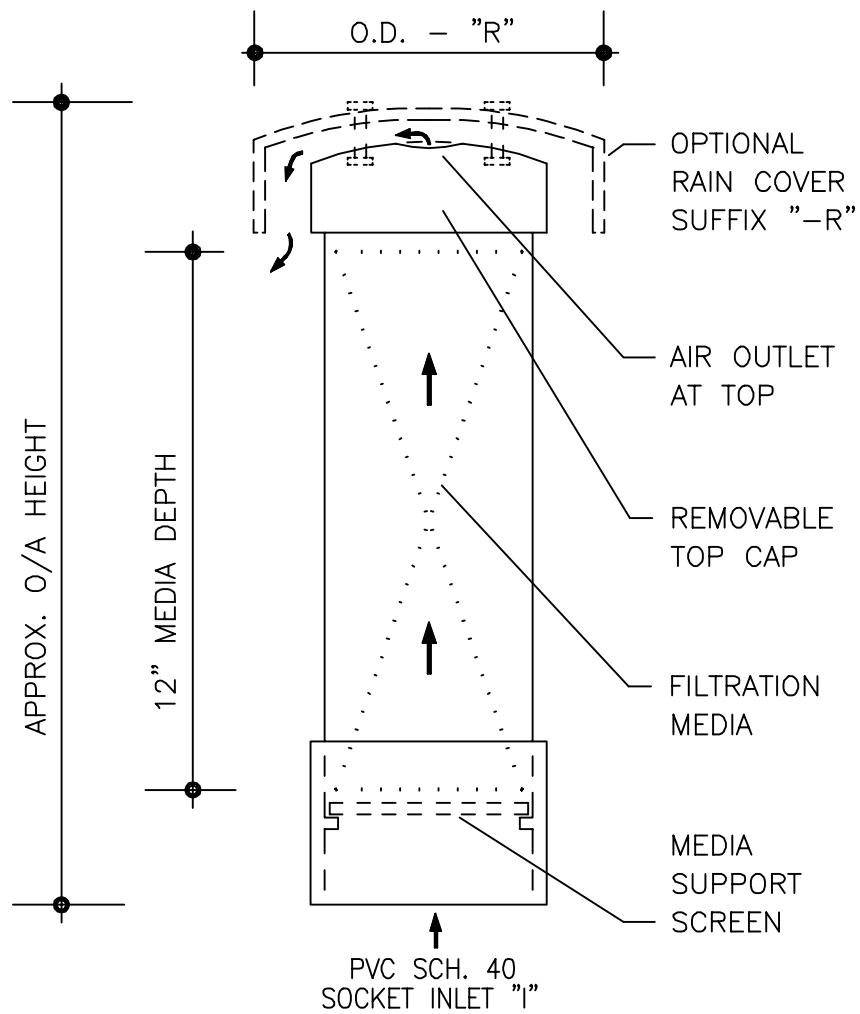
ENVIROVENT Size 2", 3", 4" & 6" Vent Adsorbers

CGL ENVIROVENT (EV) vent adsorbers are designed for efficient purification of your vapor vent or process stream. The filtration media is contained in an upflow design housing arranged for vertical mounting.

To provide long life and corrosion resistance, materials of construction are PVC with polypropylene and/or 304 SS carbon screens. The top cap is removable to allow change out of spent filtration media.

Untreated vapors enter through the bottom media support screen and flow up through the filtration media bed. Treated air exits through the screened outlet hole in the top of the housing.

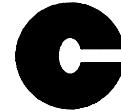
An optional rain cover (suffix "-R" on model number) is available for outdoor mounting.



| SPECIFICATIONS | | | | |
|-------------------------------------------------------------|---------------------------|------------|------------|------------|
| CGL MODEL NO. | EV2x12-.75 | EV3x12-1.7 | EV4x12-3.0 | EV6x12-6.7 |
| INLET SIZE "I" - inches | 2 | 3 | 4 | 6 |
| Approx. O/H Height - in. | 16 | 17 | 18 | 20 |
| O.D. with rain cover - in. | 5 | 7 | 7 | 9 |
| <u>MEDIA CAPACITY</u> | | | | |
| VOLUME - ft ³ | .022 | .049 | .087 | .196 |
| WEIGHT @ 34.0 lb/ft ³ density (CPCI Carbon) * | 0.75 | 1.7 | 3.0 | 6.7 |
| SHIPPING WEIGHT - lbs. * | 4 | 6 | 9 | 14 |
| MAX. FLOW - cfm | 3 | 5 | 8 | 20 |
| PRESSURE DROP - in.w.g. | 3.5 in. w.g. at max. flow | | | |
| MAX. PRESSURE / TEMP. | 12 psig at 120 °F | | | |

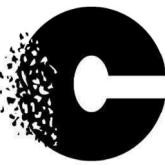
* CPCI = Coal based Pelletized Caustic Impregnated carbon. Media & shipping weights will change with ZK6 or other filtration media.

| | | | |
|-------------------------------------------------------------------------------------------------------|----------|-----|----------------|
| PROPRIETARY DRAWING | | | |
| DRAWING MAY NOT BE USED OR REPRODUCED WITHOUT WRITTEN AUTHORIZATION OF CAMERON / GREAT LAKES, INC. | | | |
| TOLERANCES: LENGTH: +/- 0.125 IN. | | | |
| | | | |
| -- | 11/22/99 | JMB | ORIGINAL ISSUE |
| REV. | DATE | BY | REMARKS |



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TITLE: GENERAL ARRANGEMENT-
ENVIROVENT VENT ADSORBER
CONN. SIZE 2, 3, 4 & 6"
SCALE: N.T.S. DRWG NO. EV-2,3,4,&6



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

Installation & Operation Procedures Vapor Scrub Carbon Adsorption Vessels

Cameron Great Lakes, Inc. Vapor Scrub and Vapor Scrub *Radial Flow* Carbon Adsorption Vessels are designed for simplicity of installation and operation. Typical installation procedures include:

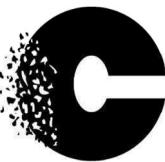
1. Place the vessel(s) in your designated area. Considerations in choosing a location include:
 - Access to all vessel connections and location and orientation of inlet & outlet ductwork,
 - Headroom over the vessel to allow spent media change out (if the unit is to be serviced *in place* as opposed to moving the unit to a different location for service), and
 - Ease of access for a forklift or pallet jack to move or change out units.

CGL Vapor Scrub units do not require special bracing or anchoring for most applications. The only requirement is a flat level surface capable of supporting the weight of the unit.

2. Please refer to the CGL specification sheet for the Vapor Scrub or Vapor Scrub *Radial Flow* series vessels [or job specific drawing(s) if supplied] for vessel weight, dimensions, and connection sizes. CGL Vapor Scrub units are designed to be installed and operated in a standing (vertical) position. Typical installation ductwork features by the owner to facilitate servicing include inlet & outlet isolation dampers and flexible hoses for connection to the process air connections. Other common features include sample taps on the inlet & outlet ductwork, pressure gauges, and temperature gauges. Be sure to use Teflon tape or other suitable pipe thread sealant/lubricant to protect pipe threads and to guard against leaks. **NOTE – Unless specifically ordered, CGL Vapor Scrub units are not rated for pressure service. Be sure not to exceed the maximum inlet pressure as noted on the specification sheet(s) provided with the unit.** Please contact CGL with any questions you may have on your proposed installation design arrangement.
3. Most Vapor Scrub units are shipped full of carbon ready for operation at the site. Some units are shipped empty for ease of handling at the jobsite...please check your sales order for details on how the initial charge of carbon was shipped for your order. **It is normal for the initial flow (1 to 2 minutes) of air out of the unit to be gray or even black in appearance** due to carbon dust or “fines” that are carried out of the carbon bed by the initial air flow. It may be desirable to vent the air exiting the unit to the outdoors or other non-sensitive area at the job site during start up. Once in operation, check system for leaks, excessive pressure drop, and filter media in the discharge hose or duct.

Caution – The adsorption process is an *exothermic* reaction. **Heat is released when volatile organic compounds (VOCs) and other contaminants are adsorbed by the carbon.** Normal system airflow through the carbon bed is usually sufficient to carry away the heat resulting from adsorption. If the carbon bed is partially spent (i.e., partially loaded with VOCs), it is recommended that the airflow be maintained through the carbon bed at all times. **Stopping the airflow may allow pockets of high VOC concentration to develop “hot spots”, and may result in damage to the carbon or create a fire hazard.** Other operating procedures for partially spent beds may include isolating the bed(s) when not in use to limit oxygen availability and/or purge and blanket the bed(s) with an inert gas. *Extreme care should*

(Continued on page 2)



CAMERON GREAT LAKES, INC.

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(Continued from page 1)

be taken in the design, monitoring and operation of any vapor phase carbon adsorption system.

Installation & Operation Procedures – CGL Vapor Scrub Carbon Vessels

Normal Operation – Monitoring of Carbon Bed Performance

The owner or operator will need to monitor the performance of the carbon bed by taking regular samples of the inlet and outlet air for laboratory or other analysis. Sample analysis and report frequency are established by the permit to operate the system or by OSHA or other Health & Safety / IAQ requirements for the site. *It is the responsibility of the owner or operator to follow all requirements of the operating permit for the system using this carbon vessel(s).*

Most systems are designed with two carbon beds connected in series flow. This allows sampling between the beds to determine when the lead bed of carbon has become “spent”. The carbon is spent when “breakthrough” occurs, evidenced by a sudden increase in the concentration of the target VOC(s) in the outlet air from the lead bed (the second bed remains on line, removing the VOCs from the air stream). Once the first bed becomes spent, it is isolated from the system, serviced as noted below, and reconnected to the system as the new “polish” or second bed.

For single bed carbon systems, at least one sample tap and valve should be provided at 50% of the bed depth to determine when approximately half of the carbon has become spent. The operator can then predict when the bed must be taken out of service for spent carbon change out as noted below.

Periodic Replacement of Spent Carbon

When the carbon in the vessel (or lead vessel) has become spent, the vessel must be taken out of service, drained of any water or other liquid which may have accumulated at the bottom of the vessel, and the spent carbon removed. For standard Vapor Scrub series vessels, the spent carbon is usually removed by vacuuming out through the top of the unit (custom design units may have a side-mounted port for removal of spent carbon by gravity flow). The empty vessel is then reloaded (through the top access opening) with fresh dry carbon and placed back in service or reconnected to the system as the new polish or second bed.

NOTE – When filling or refilling an empty vessel, load the carbon in *slowly* to avoid damage to the PVC internals at the bottom of the unit.

NOTE - It is normal for black carbon dust to be present when re-filling the unit with dry carbon as noted above. **Workers should wear dust respirators and goggles while filling the unit.** Proper ventilation of the vessel service area is recommended. Please refer to the MSDS data sheet provided with your unit(s) for additional information when working with activated carbon.

It is the responsibility of the operator to properly characterize, store, transport and dispose of the spent carbon as “hazardous” or “non-hazardous” material per applicable U.S. EPA, U.S. DOT, and applicable state guidelines. *Please contact CGL or your nearest CGL representative for assistance for periodic spent carbon vessel service and options for spent carbon reactivation or disposal service.*

Routine Maintenance

Vapor Scrub vessels require virtually no maintenance during normal operation. The operator should periodically check system pressure gauges to insure against excessive pressure drop, which could reduce airflow through the system. CGL has a policy of continuous research & product improvement and reserves the right to change specifications without notice. No warranty, expressed or implied, is made relating to the suitability of the product for any particular purpose or application.



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

Warranty, Limitation on Liability, and Service Information

Warranty - Equipment manufactured by our company is warranted for a period of 12 months from date of start-up (not to exceed fourteen (14) months from date of shipment) to be free from defects in workmanship or material. Our sale obligation under this warranty is limited to the replacement or repair, free of charge, F.O.B. our shop, of such parts as our inspection proves to be defective. This warranty will apply to our equipment that has been operated within normal capacity rating and operating conditions, and is withdrawn in the event the user makes any repairs or alterations which have not been authorized by us in writing. This warranty excludes cost of shipment to and from our shop.

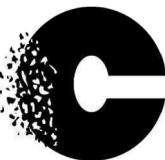
This warranty is in lieu of all other warranties expressed or implied, including all warranties of merchantability and warranties of fitness for a particular purpose. No person whatsoever is authorized by CGL to make any express warranty with respect to the merchandise referred to herein which extends beyond the scope of the warranty provided by this paragraph.

Component parts incorporated in our product which are not of our manufacture will carry only such warranty as their manufacturers allow (typically, 12 months). We will endeavor to secure for our Customer the benefits of such other manufacturer's warranty, should inspection prove such parts to be defective.

Limitation On Liability - Seller's total responsibility for damages whether arising in contract or tort arising out of or relating to its performance of this contract or the products covered hereunder shall be limited to the contract price for the product. In no event shall Seller be liable for any incidental or consequential damages such as lost profits, loss of use of productive facilities or equipment or lost production or expenses incurred in reliance on Seller's performance whether suffered by Buyer or any third party. Nothing in this paragraph shall in any way be construed to affect the liability Seller may have for personal injury or death of any third party.

Service Information - For service or technical assistance, please contact your local CGL sales representative or the nearest CGL office (locations listed below).

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

LIQUI SCRUB Models LS30-100 LS55-200 LS85-300 LS 110-

Cameron Great Lakes Liqui Scrub units are filled with high quality activated carbon, and are designed for effective purification of your liquid waste or process stream. CGL Liqui Scrub units have a proven ability to remove organic contaminants to non-detectable levels.

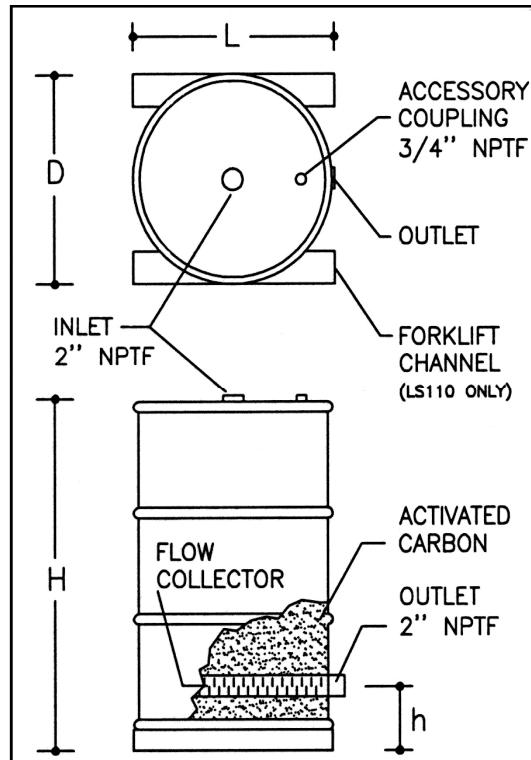
CGL Liqui Scrub units are constructed of heavy-duty mild steel and are lined with doubled layered epoxy coatings. Forklift channels are provided on the LS 110 model only. Adsorber internals consist of a PVC underdrain designed for even flow distribution and complete carbon bed use. Downflow operation is standard.

For ease in process maintenance, spent carbon can be removed on site from the vessel by hand or vacuuming out by removing the vessel top head. Alternatively, the spent vessel can be shipped off site for reactivation service or disposal.

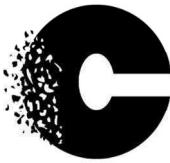
Please contact your nearest CGL office or representative for additional information on disposal and service options.

SPECIFICATIONS

| Model VS | 30-100 | 55-200 | 85-300 | 110-400 |
|------------------------------------|--------|--------|--------|---------|
| H - height, in. | 30 | 36 | 40 | 46 |
| D - diameter, in. | 19 | 24 | 26 | 32 |
| L - length, in. | na | na | na | 42 |
| H - height, in. | 4.3 | 6 | 5 | 8 |
| Design Flow, (gpm)* | 5 | 10 | 15 | 20 |
| Pressure Drop at Design Flow (psi) | 0.8 | 1.0 | 1.2 | 1.3 |
| Max Pressure, psig | 8 | 8 | 8 | 8 |
| Max Temp, deg. F | 125 | 125 | 125 | 125 |
| Carbon Capacity Weight, lbs. | 100 | 200 | 300 | 400 |
| Volume, cu. ft. | 3.9 | 7.1 | 10.0 | 16.1 |
| Shipping Weight, lbs. | 150 | 270 | 380 | 640 |



*Based on 5 minutes contact time. System design may be dictated by chemistry and residence time required.



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

LIQUI SCRUB POLY CUBE ADSORPTION VESSEL LS30—150PC

The **LIQUI SCRUB** Poly Cube Adsorption Vessel is the ideal solution for difficult applications. These vessels are constructed from high density polyethylene with black pigment for maximum ultraviolet resistance and has outstanding performance even with the most corrosive applications. The Poly Cube Adsorption Vessel is designed with the user in mind...from the closed top for non-leak performance at elevated pressures... to the top handle for easy handling - even with a forklift or sling.

BENEFITS

No metal parts for easy thermal destruction

Vessel construction meets FDA requirements for direct food contact

Completely corrosion resistant

Meets DOT-34 and UN Hazardous requirements

Easy field installation

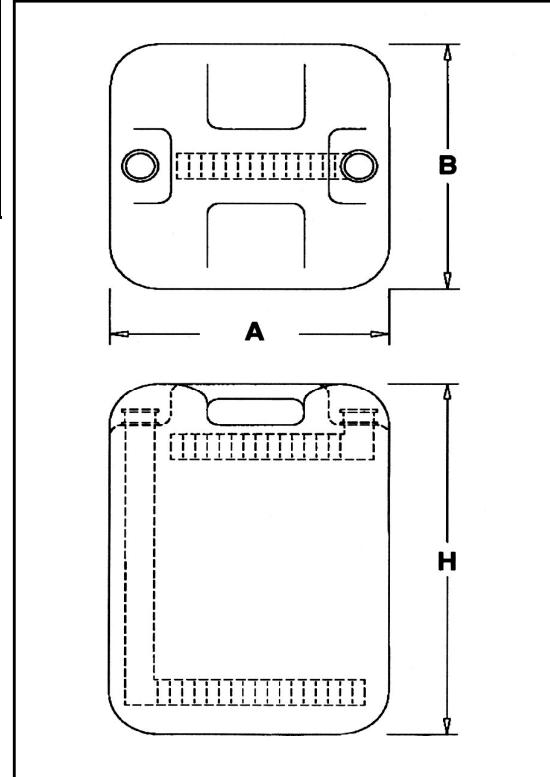
Maintains structural integrity at low temperatures

SPECIFICATIONS

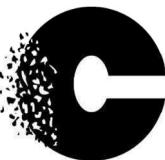
| | |
|-------------------------------------------|---------|
| LS | 150 PC |
| INLET/OUTLET(in.)* | 2" / 2" |
| H - Height (in.) | 29 |
| A - Width (in.) | 19 |
| B - Depth (in.) | 19 |
| Max Flow (GPM)* | 10 |
| Max Pressure (PSIG) | 28 |
| Recommended Max Operating Pressure (PSIG) | 8 |
| Max Temp (F) | 125 |
| Volume (cubic feet) | 3.5 |

| MEDIA | |
|----------------------|----|
| CG 8 x 30, pounds | 75 |
| OMZ, Pounds | 75 |

The special blend of high activity coal based carbon and specialty treated zeolite provides the end user with an adsorption unit to capture free oils and grease (OMZ), as well as to adsorb standard dissolved VOC contaminants (activated carbon).



* Safety Kleen Units supplied separately with a series of bushings reducing from 2" inches to a 1/4 inch hose barb connection for operation.



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LIQUI SCRUB Models LS1000P(15) - LS1000P(30)

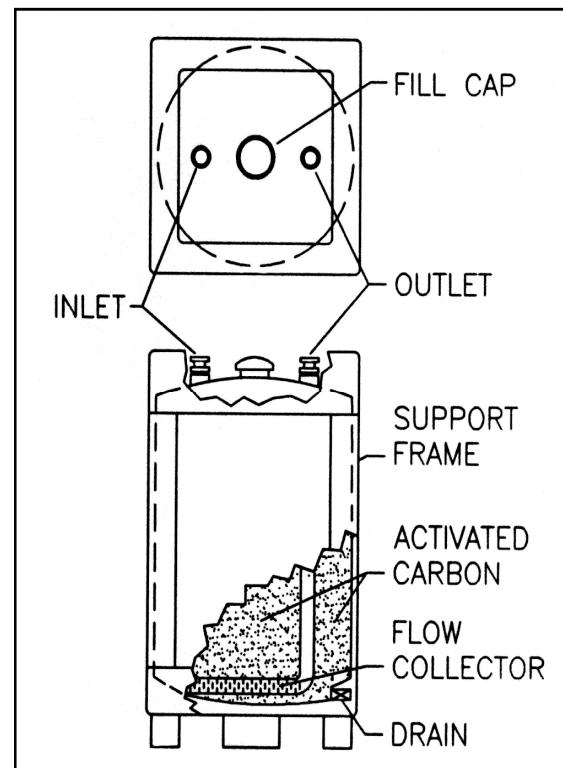
The Cameron Great Lakes Liqui Scrub unit model LS1000P is filled with high quality activated carbon, and is designed for effective purification of your liquid waste or process stream. The LS1000P has a proven ability to remove organic contaminants to non-detectable levels.

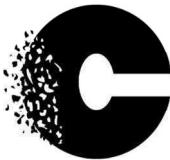
The LS1000P features a *pressure rated* (15 or 30 psig) polyethylene (PE) cylindrical tank encased in a very strong 1/2" thick PE frame on a square base with 4-way forklift access. Adsorber internals consist of a PVC underdrain designed for even flow distribution and complete carbon bed use. Downflow operation is standard.

For ease in process maintenance, spent carbon can be removed on site from the vessel by hand or vacuuming out the top 6" fill port or by slurry. Alternatively, the spent vessel can be shipped off site for reactivation service or disposal.

Please contact your nearest CGL office or representative for additional information on disposal and service options.

| Model LS1000P | (15) | (30) |
|---------------------------------|-------------|-------------|
| Inlet/Outlet Male Quick Connect | 2 | 2 |
| Carbon Access/Fill Port, in. | 6 | 6 |
| Carbon Drain valve, in. | 2 | 2 |
| Water Drain Valve, in. | 1 | 1 |
| Height, in. | 70 | 70 |
| Base, in. | 46 x 46 sq. | 46 x 46 sq. |
| Max Flow, (gpm) | 50 | 50 |
| Max Inlet Pressure, psig | 15 | 30 |
| Pressure Drop at max Flow (psi) | 3 | 3 |
| Max Temp, deg. F | 170 | 170 |
| Carbon Capacity Weight, lbs. | 1000 | 1000 |
| Volume, cu. ft. | 34 | 34 |
| Shipping Weight, lbs. | 1450 | 1500 |





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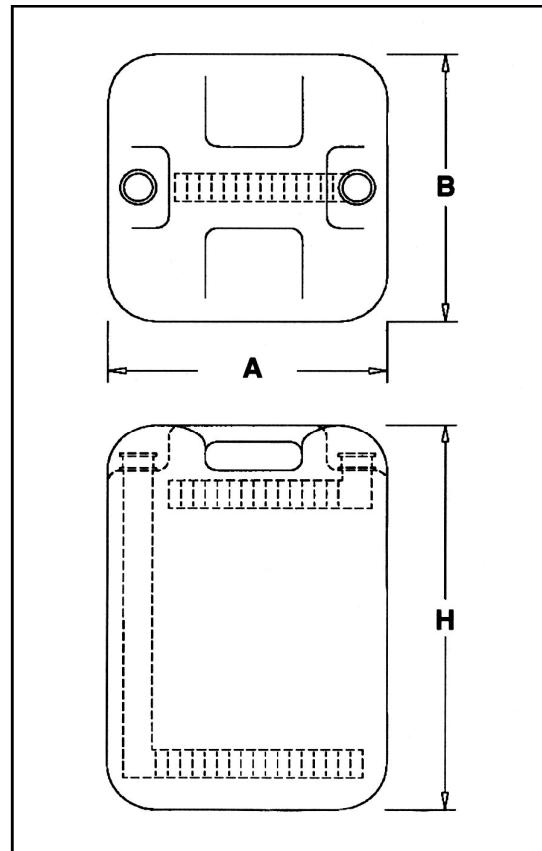
LIQUI SCRUB POLY CUBE ADSORPTION VESSELS LS100PC - LS150PC - LS200PC

The LIQUI SCRUB Poly Cube Adsorption Vessels are the ideal solution for difficult applications. These vessels are constructed from high density polyethylene with black pigment for maximum ultraviolet resistance and has outstanding performance even with the most corrosive applications. The Poly Cube Adsorption Vessel is designed with the user in mind...from the closed top for non-leak performance at elevated pressures... to the top handle for easy handling - even with a forklift or sling.

- No metal parts for easy thermal destruction
- Meets DOT-34 and UN Hazardous requirements
- Vessel construction meets FDA requirements for direct food contact
- Easy field installation
- Completely corrosion resistant
- Maintains structural integrity at low temperatures

| SPECIFICATIONS | | | |
|------------------------------------|---------|--------|--------|
| LS | 100 PC | 150 PC | 200 PC |
| INLET/OUTLET(in.) | .75"/2" | 2"/2" | 2"/2" |
| H - Height (in.) | 20" | 29" | 33" |
| A - Width (in.) | 15" | 19" | 23" |
| B - Depth (in.) | 15" | 19" | 23" |
| Max Flow (GPM)* | 5 | 10 | 15 |
| Max Pressure (PSIG) | 28 | 28 | 28 |
| Recommended Max Operating Pressure | 8 | 8 | 8 |
| Max Temp (F) | 125 | 125 | 125 |

| CARBON CAPACITY | | | |
|-----------------|-----|-----|-----|
| WEIGHT(LB)** | 45 | 100 | 200 |
| VOLUME(FT3) | 1.5 | 3.5 | 6.7 |
| OMZ WIEGHT(LB) | 90 | 200 | 400 |





CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

HIGH PRESSURE STEEL FILTER VESSELS

CONSTRUCTION

The filter vessels are electric welded, low carbon steel constructed. The vessels are designed for 100 PSIG working pressure and factory tested. The vessels are either lined with 6 mils DFT phenolic epoxy and the exterior coated with a rust inhibiting primer and top coat or hot dip galvanized. Vessels with a 30 inch diameter and less have two 4 x 6 inch hand hole in the top head and lower side shell. Tanks with a 36 inch diameter to 60 inch diameter have an 11 x 15 manway in the top head and a 4 x 6 inch hand hole in the lower side shell. Tanks with a 66 inch diameter and larger have two 11 x 15 inch manways, one in the top head and one in the lower side shell. Standard connections are NPT threaded full couplings.

OPTIONAL: ASME CODE pressure vessels are fabricated and stamped in accordance with ASME code, Sec. 8, Div. 1. Vessels are available with special pressure ratings, connections, relief valves, various openings and interior and exterior coatings. Vessels are furnished with flanged connections when required.

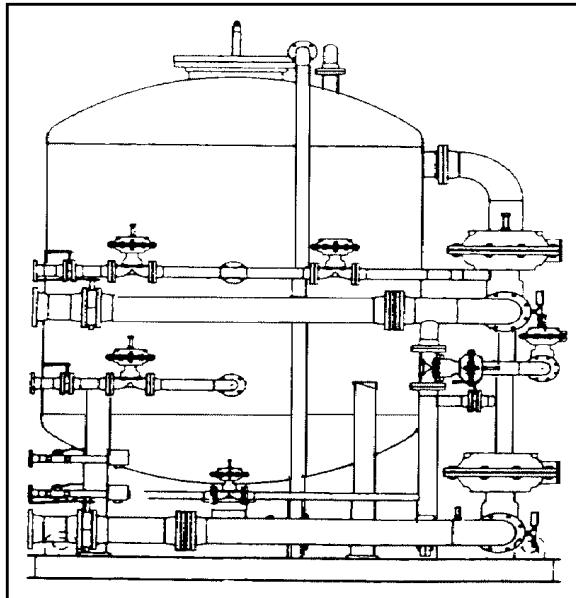
DISTRIBUTOR SYSTEM

Filter Vessels with a 36" diameter and smaller, will be equipped with an outlet distributor hub. Vessels 42" in diameter and larger will include a header lateral distributor system. All vessels shall include an inlet diffuser for even distribution of water or liquid and to prevent media loss during backwashing.

FILTRATION MEDIA

ACTIVATED CARBON: The activated carbon shall be 8 x 30 or 12 x 40 mesh, 60% CTC activity, 750 minimum iodine number and a minimum abrasion number of 75. Additional grades available.

ORGANOPHILIC MEDIA: This filtration media is a proprietary quarternary amine modified granular bentonite clay or zeolite. The clay is mixed (30:70 by weight) with granular activated carbon. If backwashing is required, anthracite may be substituted for the activated carbon. (Please request OMZ Product Bulletin for additional information.)

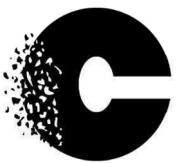


OPTIONS AND ACCESSORIES

- A. Flanged or threaded connections.
- B. Linings: Rubber, epoxy, galvanizing, fiberglass.
- C. Number, size, and location of manways, handholes, fittings;
- D. Valves, automatic air vents, face piping, controls.
- E. Vessel pressure ratings and certifications: ASME, National Board, Military, AWWA
- F. Various grades and mesh sizes or media.
- G. Additional diameters and sideshell lengths.

Cameron Great Lakes, Inc. has a policy of continuous research, development and product improvement and reserves the right to change design and specifications without notice.

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

| FLOW GPM | EBCT MINUTES | DIAMETER A | SIDESHELL B | OAH APPROX. | CARBON WEIGHT | FULL VESSEL WEIGHT |
|----------|--------------|------------|-------------|-------------|---------------|--------------------|
| 15 | 7.5 | 24" | 60" | 75" | 450 lbs. | 700 lbs. |
| 15 | 8.9 | 24" | 72" | 87" | 525 lbs. | 900 lbs. |
| 25 | 6.7 | 30" | 60" | 79" | 675 lbs. | 1050 lbs. |
| 35 | 7.5 | 36" | 60" | 84" | 1000 lbs. | 1650 lbs. |
| 50 | 7.0 | 42" | 60" | 88" | 1400 lbs. | 2475 lbs. |
| 60 | 7.8 | 48" | 60" | 95" | 1850 lbs. | 2900 lbs. |
| 80 | 7.4 | 54" | 60" | 97" | 2350 lbs. | 3650 lbs. |
| 115 | 9.2 | 66" | 72" | 117" | 4200 lbs. | 6600 lbs. |
| 150 | 8.4 | 72" | 72" | 119" | 5000 lbs. | 7700 lbs. |

NOTES:

1. Flow Rate based upon hydraulic loading rate of 5 GPM/Sq. ft. bed face area.
2. EBCT: Empty bed contact time
3. Carbon and full vessel weight: Approx. weight based upon an average bulk density of 30 lbs. Per cubic foot, full vessel fill.
4. 24" to 72" diameter vessels may be furnished with 4 structural angle legs for unitary base mounting, 48" and larger ves-

STANDARD CONFIGURATION

| DIAMETER | C & D FITTINGS | E OPENING | F OPENING | G SPUD | H DISTANCE |
|---------------|----------------|---------------------|---------------------|--------|------------|
| 24", 30" | 2" NPT | 4" x 6" HANDHOLE | 4" x 6" HANDHOLE | 1.25" | 6" |
| 36 ", 42" | 3" NPT | 4" x 6" HANDHOLE | 11" x 15" MANWAY | 2" | 9" |
| 48", 66", 72" | 4" NPT | 4" x 6" HANDHOLE | 11" x 15" MANWAY | 2" | 12" |

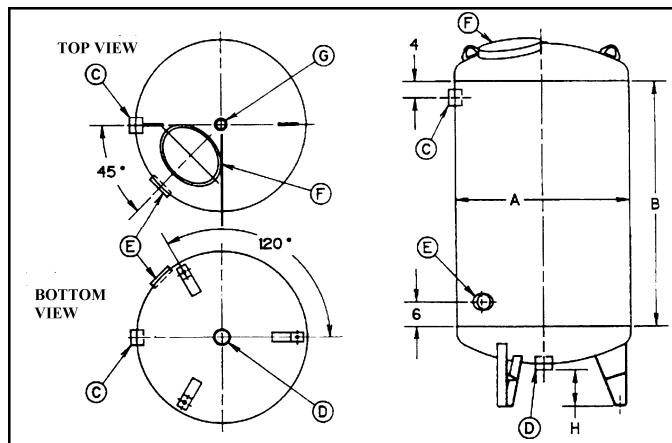
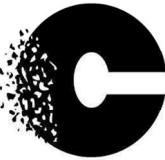


DIAGRAM CODES

| | |
|--------|--------|
| G: | VENT |
| C: | INLET |
| D: | DRAIN |
| E & F: | ACCESS |

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CAMERON GREAT LAKES, INC.

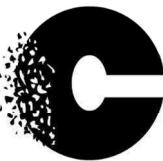
MOLECULAR FILTRATION SPECIALISTS

Installation Procedures – LiquiScrub Pressure Rated Carbon Vessels

Cameron Great Lakes, Inc. LiquiScrub 100 PSIG Pressure Rated Carbon Adsorption Vessels (“LS-HP”) are designed for simplicity of installation and operation. Please follow the procedures outlined below to install your vessel(s):

1. Place the vessel in your designated area. Considerations in choosing a location of your vessel include access to all vessel connections, location and orientation of inlet & outlet piping, and headroom over the vessel to allow spent carbon removal and re-charge with fresh granular activated carbon (GAC) or other filtration/adsorption media as specified on your initial order. The vessel does not require special bracing for most applications. The only requirement is a flat level surface capable of supporting the weight of the unit when full of water. Anchoring the vessel legs to the floor is desirable but not mandatory. *Freeze protection of the vessel and piping is the responsibility of the owner or installation contractor.*
2. Please refer to the CGL specification sheet for the LS-HP series vessels [or job specific drawing(s) if supplied] for vessel weight, dimensions, and connection sizes. LS-HP series vessels are designed for downflow operation. Typical installation piping features by the owner to facilitate servicing include inlet & outlet isolation valves, a vent valve connected to the top of the vessel, and a drain valve. Other common piping features include sample taps on the inlet & outlet piping, pressure gauge(s), and backwash piping. Be sure to use Teflon tape or other suitable pipe thread sealant/lubricant to protect the pipe threads and to guard against leaks. **The installer must provide a pressure relief valve set at 100 PSIG and sized for the maximum water flow if the pressure in the system can reach or exceed 100 PSIG. Please contact CGL with any questions you may have on your proposed installation piping design and general arrangement.**
3. Standard LS-HP units are shipped empty, lying down on the side shell on a special pallet. The GAC is shipped separately in bulk sacks or 50 pound bags per your initial order. Once the empty vessel has been installed, the vessel is filled with the GAC by gravity flow through the top access fitting or manway. *It is normal for black carbon dust to be present when filling the unit with dry carbon in this manner. Workers should wear dust respirators and goggles while filling the unit.* Proper ventilation of the installation area is recommended. Please refer to the enclosed MSDS data sheet for additional information when working with carbon.
4. Fill the vessel from the top with clean water until all of the carbon is covered by water. Leave the top cap off and let the carbon soak for a minimum of 4 hours to allow air trapped in the carbon micropore structure to escape through the top vent.
5. After initial soaking, the filter bed must be rinsed, preferably with clean water. **It is normal for the initial flow of water out of the unit to be gray or even black in appearance** due to carbon dust or “fines” which need to be rinsed out of the filter bed. The discharge water should be directed to an open drain or the inlet tank so the operator can observe when the water begins to run clean. Rinsing typically requires 10 to 15 minutes of operation at rated flow. Be sure that the water flow for bed rinsing is downflow (i.e., the same as the normal process flow).
6. Once the filter media bed is rinsed, it can be placed in service. DO NOT exceed the maximum pressure rating or flow rating of the vessel. Check system for leaks, excessive pressure drop, and filter media in the discharge line. *Please contact CGL if any questions or problems arise.*

(Continued on page 2)



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

(Continued from page 1)

Installation Procedures – CGL LS-HP Series Carbon Vessels

Normal Operation – Monitoring of Carbon Bed Performance

The owner or operator will need to monitor the performance of the carbon bed by taking regular samples of the inlet and outlet water for laboratory analysis. Sample analysis and report frequency are established by the state or other government agency granting the permit to operate the system. It is the responsibility of the owner or operator to follow all requirements of the operating or discharge permit for the system using this carbon vessel(s).

Most systems are designed with two carbon beds piped in series flow. This allows sampling between the beds to determine when the lead bed of carbon has become “spent”. The carbon is spent when “breakthrough” occurs, evidenced by a sudden increase in the concentration of the target VOC(s) in the outlet water from the lead bed (the second bed remains on line, removing the VOCs from the water stream). Once the first bed becomes spent, it is isolated from the system, serviced as noted below, and reconnected to the system as the new “polish” or second bed.

For single bed carbon systems, at least one sample tap and valve should be provided at 50% of the bed depth to determine when approximately half of the carbon has become spent. The operator can then predict when the bed must be taken out of service for spent carbon change out as noted below.

Periodic Replacement of Spent Carbon

When the carbon in the vessel (or lead vessel) has become spent, the vessel must be taken out of service, drained of all free water, and the spent carbon removed. For LS-HP series vessels, the spent carbon is usually removed by vacuuming out through the top access fitting or man-way. The empty vessel is then rinsed and refilled with fresh dry carbon as noted in step 3 above. The new carbon bed is then soaked and rinsed as noted in steps 4 and 5 above. After rinsing, the carbon vessel is placed back in service or reconnected to the system as the new polish or second bed.

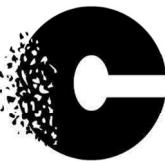
It is the responsibility of the operator to properly characterize, store, transport and dispose of the spent carbon as “hazardous” or “non-hazardous” material per applicable U.S. EPA, U.S. DOT, and applicable state guidelines. Please contact CGL or your nearest CGL representative for assistance for periodic spent carbon vessel service and options for spent carbon reactivation or disposal service.

Routine Maintenance & Backwashing (optional)

The LS-HP vessel requires virtually no maintenance during normal operation. The operator should periodically check system pressure gauges to insure against sediment build up in the piping and carbon bed(s). The top head(s) of the carbon vessel(s) should be periodically vented to remove any trapped air that can cause a reduction of pump flow. If particulate matter becomes a problem in the influent water, installation of a 10 micron rated filter before the lead carbon bed is recommended. This will assist in extending the carbon service life, reduce internal pressure drop, and facilitate change of the spent carbon.

The clean pressure drop of your LS-HP vessel at rated flow should be about 3 psig. If a gradual, minor increase in pressure drop across the carbon bed is observed, periodic backwashing may be performed on the bed. To backwash the unit, the water flow and connections are reversed (either by use of hoses with quick connect fittings or by suitable valves in the piping). The backwash flow rate should be approximately *twice* the rated design flow or set at 10 gpm/sq.ft. of bed area.

CGL has a policy of continuous research & product improvement and reserves the right to change specifications without notice. No warranty, expressed or implied, is made relating to the suitability of the product for any particular purpose or application.



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

BULK MEDIA FOR COMMERCIAL AND INDUSTRIAL APPLICATIONS

VAPOR PHASE ACTIVATED CARBONS

- **CGL-CC:** Granular coconut shell activated carbon. Carbon tetrachloride number (CTC) 60% minimum. Recommended for **general odor control** and removal of **volatile organic compounds**.
- **CGL-GAC:** Granular bituminous **coal based** activated carbon. Can often be substituted for CGL-CC in many applications.
- **CGL-CP:** Pelletized **coal** base activated carbon. Offers symmetry of carbon. Offers the least air resistance.

SPECIALTY CARBONS

- **CGL-CI:** High activity, specially treated activated carbon media designed for vapor phase odor control. Recommended for **removal of hydrogen sulfide, sulfur dioxide** and many odors associated with sewage wastes, and pulp and paper mills. It is also ideally suited for air purification in museums, archives and storage facilities.
- **CGL-PA:** High activity treated granular carbon for use in controlling **ammonia and amine odors**. Specific applications include, fertilizer plants and livestock and veterinary facilities.
- **CGL-SU:** Granular activated carbon specially treated for the efficient removal of **mercury vapors**. Applications include mining operations, battery production and laboratories.
- **CGL-KI:** Specially treated granular coconut shell based activated carbon that meets ASTMAO69 specifications for nuclear grade carbons. It is suitable for the removal of **radioactive iodides and organic iodides** from steam - air mixtures at temperatures below 200° C. Applications include nuclear power plants and research facilities.

SPECIALTY MEDIA

- **CGL-ZK6:** A new patented aluminosilicate compound impregnated with **6% potassium permanganate**. It is designed to oxidize gaseous contaminants including **hydrogen sulfide, sulfur dioxide, formaldehyde, ethylene, mercaptans and alcohols**. The media offers more active ingredient and less dust than other alumina-based products. Applications include cold fruit storage, compressor intakes, exhaust systems, and general HVAC applications.

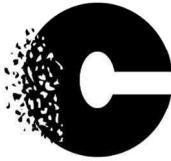
NOTES: Most media is available in common mesh sizes including 4x6, 4x8, and 4x10. The most commonly used size in the HVAC industry is 4x8. Custom sizing is available on most products. For more detailed information on the media please refer to the specific product bulletin.

Media Packaging Options

5 Gallon Pails: 20 pounds (0.67cf³)
Boxes.....: 30 pounds (1.0 f³)
Bags.....: 50 pounds (1.8cf³)

14 Gallon Drums.: 50 pounds (1.67 cf³)
55 Gallon Drums.: 200 pounds (6.67 cf³)
Bulk Super Sacks: 1000 pounds (33.34 cf³)

Weights above are based on a media density of 30 pounds per cf³. Packages will accommodate more weight with media of heavier densities. See individual specification sheets for actual media bulk density.



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL CCS

DESCRIPTION

Coconut shell activated carbon with a well developed pore structure, providing a wide range of molecular adsorption. Media is available in various mesh sizes.

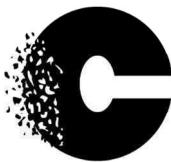
APPLICATIONS

Controls a wide range of molecular weights making it ideally suited for all general commercial and industrial air filtration applications requiring chemical filtration.

Physical Properties

| | |
|-------------------------------------------------|--------------------|
| Activity for CCL ₄ , (ASTM D3467-94) | 60 - 65% |
| Bulk Density, Typical | 29 — 30 LBS/ CU FT |
| Moisture content, As Packed | 2% |
| Ball Pan Hardness, (ASTM D3802-79) | 98, Minimum |
| Iodine Number, MG/G (ASTM 4607-94) | 1150, Minimum |
| Ash Content, Maximum | 3% |

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL CCS 6 x 12

DESCRIPTION

Coconut shell activated carbon with a well developed pore structure, providing a wide range of molecular adsorption.

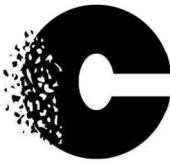
APPLICATIONS

Controls a wide range of molecular weights making it ideally suited for all general commercial and industrial air filtration applications requiring chemical filtration.

Physical Properties

| | |
|-------------------------------------------------|---------------|
| Activity for CCL ₄ , (ASTM D3467-94) | 60 - 65% |
| Bulk Density, Typical | 29 LBS/ CU FT |
| Moisture content, As Packed | 2% |
| Ball Pan Hardness, (ASTM D3802-79) | 98, Minimum |
| Iodine Number, MG/G (ASTM 4607-94) | 1150, Minimum |
| Ash Content, Maximum | 3% |

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL CP48

DESCRIPTION:

CP 48 is a bituminous coal based 4 mm pelletized activated carbon of high adsorptive capacity. It has a well developed pore structure for the adsorption of a wide range of volatile organic compounds.

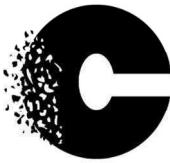
APPLICATIONS:

It is ideally suited for critical applications such a process gas purification, solvent vapor recovery and catalyst support.

Physical Properties

| | |
|-------------------------------------------------|-------------------|
| ACTIVITY for CCL ₄ , (ASTM D3467-94) | 60, minimum |
| BULK DENSITY, TYPICAL | 26-28 lbs / cu ft |
| HARDNESS, (ASTM D3808-79) | 98, min |
| MOISTURE, AS PACKED, (ASTM D2867-95) | 2 % |
| ASH CONTENT, TYPICAL | 10 - 12 % |

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL CI

DESCRIPTION

CGL/CI is a specially treated activated carbon designed for use in vapor phase odor control and corrosion control. It is available on pelletized carbon, granular bituminous coal, and granular coconut shell activated carbon.

APPLICATIONS

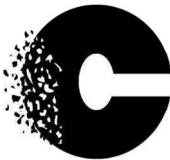
It is ideally suited for the removal of hydrogen sulfide, sulfur dioxide, hydrogen chloride, chlorine, fluorine, bromine, methyl mercaptans and other reactive and acid gases typically found in the treatment of sewage wastes, pulp and paper mills, and chemical plants.

Physical Properties

| | |
|--------------------------------------------------|---------------------------------------|
| Apparent Density, (ASTM D2854-89) | 0.55 G/CC Typical |
| Maximum Head Loss at 50 FPM | 1.2" wc/FT of Bed Depth |
| Moisture Content (ASTM D2867-95) | 10% |
| Hardness, (ASTM D-3802-79) | 95 |
| Hydrogen Sulfide, Minimum Breakthrough Capacity* | 0.14G H ₂ S/CC Carbon, 23% |
| Time to .01 PPM H ₂ S Breakthrough | 851 Hours |

*Hydrogen sulfide breakthrough capacity is determined by passing a moist air stream (85% RH) containing 1% hydrogen sulfide, at a rate of 1450 cc/min, through a 1.0" diameter x 9" deep bed of uniformly packed activated carbon and monitored to 50 ppm breakthrough.

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL CCSCI

DESCRIPTION

CGL/CCSCI is a specially treated coconut shell activated carbon designed for use in vapor phase odor control and corrosion control.

APPLICATIONS

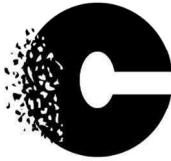
It is ideally suited for the removal of hydrogen sulfide, sulfur dioxide, hydrogen chloride, chlorine, fluorine, bromine, methyl mercaptans and other reactive and acid gases typically found in the treatment of sewage wastes, pulp and paper mills, and chemical plants.

Physical Properties

| | |
|--------------------------------------------------|---------------------------------------|
| Apparent Density, (ASTM D2854-89) | 0.55 G/CC Typical |
| Base Carbon | Virgin Coconut Shell |
| Maximum Head Loss at 50 FPM | 1.2" wc/FT of Bed Depth |
| Moisture Content (ASTM D2867-95) | 10% |
| Hardness, (ASTM D-3802-79) | 95 |
| Hydrogen Sulfide, Minimum Breakthrough Capacity* | 0.14G H ₂ S/CC Carbon, 23% |
| Time to .01 PPM H ₂ S Breakthrough | 851 Hours |

*Hydrogen sulfide breakthrough capacity is determined by passing a moist air stream (85% RH) containing 1% hydrogen sulfide, at a rate of 1450 cc/min, through a 1.0" diameter x 9" deep bed of uniformly packed activated carbon and monitored to 50 ppm breakthrough.

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL CPCl

DESCRIPTION

CGL /CPCI is a specially treated high activity coal based pelletized activated carbon designed for use in vapor phase odor control and corrosion control.

APPLICATIONS

It is ideally suited for the removal of hydrogen sulfide, sulfur dioxide, hydrogen chloride, chlorine, fluorine, bromine, methyl mercaptans and other reactive and acid gases typically found in the treatment of sewage wastes, pulp and paper mills, and chemical plants.

Physical Properties

| | |
|--------------------------------------------------|--------------------------------------|
| Apparent Density, (ASTM D2854-89) | 0.55 g/cc Typical |
| Maximum Head Loss at 50 FPM | 1.2" wc/ft of Bed Depth |
| Moisture Content (ASTM D2867-95) | 10% |
| Hardness, (ASTM D-3802-79) | 95 |
| Hydrogen Sulfide, Minimum Breakthrough Capacity* | 0.14G H ₂ S/ccCarbon, 23% |
| Time to .01 PPM H ₂ S Breakthrough | 851 Hours |

*Hydrogen sulfide breakthrough capacity is determined by passing a moist air stream (85% RH) containing 1% hydrogen sulfide, at a rate of 1450 cc/min, through a 1.0" diameter x 9" deep bed of uniformly packed activated carbon and monitored to 50 ppm breakthrough.

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL/PA

DESCRIPTION: CGL/PA is a high activity, specially impregnated activated carbon. It is available on both coconut shell and coal pellet.

APPLICATIONS: Removal of ammonia and amines in vapor phase applications.

PHYSICAL PROPERTIES:

| BASE MATERIAL | |
|---------------------------------------------|----------------------|
| ACTIVITY FOR CCL ₄ (ASTM D-3467) | 60% |
| BULK DENSITY, TYPICAL | 30 LBS/CU FT. |
| BALL PAN HARDNESS (ASTM D3082-79) | 95 MINIMUM |
| FINISHED PRODUCT | |
| BULK DENSITY, TYPICAL | 35 LBS/CU FT. |
| AMMONIA (NH ₃) REMOVAL | 7 %* |

* Equals 30% of the weight of the base of activated carbon before treatment.

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGLCCSPA

- DESCRIPTION:** CGLCCSPA is a high activity, specially impregnated virgin coconut shell activated carbon.
- APPLICATIONS:** Removal of ammonia and amines in vapor phase applications.

PHYSICAL PROPERTIES:

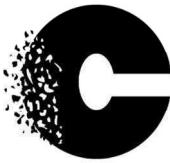
BASE MATERIAL

| | |
|---------------------------------------------|----------------------|
| ACTIVITY FOR CCL ₄ (ASTM D-3467) | 60% |
| BULK DENSITY, TYPICAL | 30 LBS/CU FT. |
| BALL PAN HARDNESS (ASTM D3082-79) | 95 MINIMUM |

FINISHED PRODUCT

| | |
|-----------------------------------------------|----------------------|
| BULK DENSITY, TYPICAL | 34 LBS/CU FT. |
| H ₃ PO ₄ % (dry weight) | 13 +/- .5 |

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL CPPA

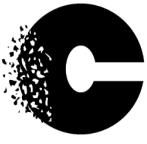
DESCRIPTION: CGL/CPPA is a high activity, specially impregnated activated carbon pellet.

APPLICATIONS: For use in vapor phase applications for ammonia and amine removal.

PHYSICAL PROPERTIES:

| BASE MATERIAL | |
|---------------------------------------------|----------------------|
| ACTIVITY FOR CCL ₄ (ASTM D-3467) | 60% |
| BULK DENSITY, TYPICAL | 30 LBS/CU FT. |
| BALL PAN HARDNESS (ASTM D3082-79) | 95 MINIMUM |
| FINISHED PRODUCT | |
| BULK DENSITY, TYPICAL | 35 LBS/CU FT. |
| AMMONIA (NH ₃) REMOVAL | 6-7 % |

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL ZK6

OXIDIZES
ACID GASES

CONTROLS ODOR

OFFERS MORE
KMnO₄

LESS DUST
FOR EASY HANDLING

ZK6 is an air filtration media specifically designed to oxidize gaseous pollutants such as hydrogen sulfide, sulfur dioxide, formaldehyde, ethylene, and mercaptans.

This unique media is ideally suited for corrosion control and protection of electronic process controls in industrial environments; odor abatement in sewerage treatment facilities and odor and control in public buildings. It provides superb protection of perishable commodities in the fresh food industry.

ZK6 is made from a unique aluminosilicate compound possessing significant molecular sieve sorption capacity and is impregnated with 6% potassium permanganate.

| | |
|---------------------------------------|-------------------|
| BULK DENSITY, LBS/ CU FT. | 60 average |
| PORE SIZE, ANGSTROMS | 4.0 |
| Physical Properties | |
| HARDNESS, MOHS SCALE | 5.1 |
| KMnO ₄ , PERCENT BY WEIGHT | 6% |
| SPECIFIC SURFACE AREA, SQ.YDS./OZ. | 1357 |

Page 1 of 2

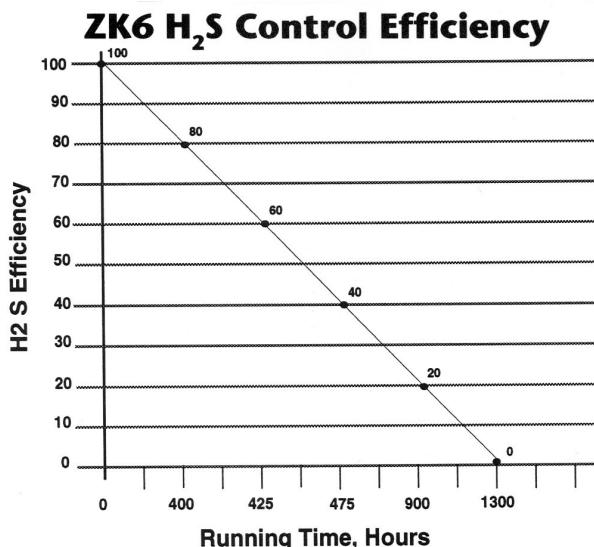


CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

Page 2 of 2

The chart below illustrates the ZK6 efficiency when challenged with 50 ppm of hydrogen sulfide. The media lasted in excess of 1300 hours before being expended.



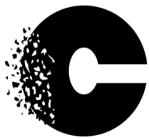
COST EFFECTIVE

The **ZK6** media has 6% KMnO₄ as compared to most 4% impregnate levels for standard alumina pellets. Additionally, the bulk density at 60 pounds per cubic foot gives 20% more media in the same space allotment. This means on a volumetric basis, the **ZK6** contains 1.8 times the active ingredient than the alumina pellets. Pound for pound the **ZK6** provides 50% more active ingredient. As a result, the **ZK6** provides longer system life, lower maintenance costs and lower handling costs.

ZK6 presents no health hazard when shipped, stored and handled correctly. Please refer to our Material Safety Data Sheet for more complete information.

Please contact Cameron Great Lakes, Inc. or your local distributor for futher information

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL C/ZK6

OXIDIZES
ACID GASES

CONTROLS
ODOR

CGLC/ZK6 is a 50/50 blend by weight of activated carbon and our ZK6 air filtration media. It is specifically designed to oxidize gaseous pollutants such as hydrogen sulfide, sulfur dioxide, formaldehyde, ethylene, and mercaptans, and remove high molecular weight volatile organic compounds.

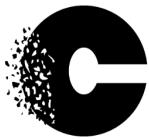
This blended media is ideally suited for odor and control in public buildings, hospitals and airports.

Physical Properties

| | |
|----------------------------------------|---------------------------------------------------------------|
| BULK DENSITY, LBS/ CU FT. | 40 |
| CTC, Activity % (Activated carbon) | 60 minimum |
| KMnO ₄ , % by weight (ZK6) | 6 % |
| Removal %, by weight | H2S- 8 %, NO2- 1%, SO2-3.5 %, Nitric dioxide- 2.5% |

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL C/ZK6 -V

OXIDIZES
ACID GASES

CONTROLS
ODOR

Adsorbs
VOC'S

CGLC/ZK6 is a 50/50 blend by volume of activated carbon and our ZK6 air filtration media. It is specifically designed to oxidize gaseous pollutants such as hydrogen sulfide, sulfur dioxide, formaldehyde, ethylene, and mercaptans, and remove high molecular weight volatile organic compounds.

This blended media is ideally suited for odor control in public buildings, hospitals, airports, casinos, and similar applications where there are multiple contaminates.

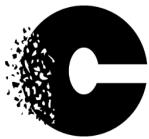
Maximum operating temperature is 120 F.

Physical Properties

| | |
|----------------------------------------|-------------------|
| BULK DENSITY, LBS/ CU FT. | 45 |
| CTC, Activity % (Activated carbon) | 60 minimum |
| KMnO ₄ , % by weight (ZK6) | 6 % |

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL C/KOR48

OXIDIZES
ACID GASES

CONTROLS
ODOR

UL CLASS I

CGLC/KOR48 is a 50/50 blend by volume of activated carbon and our air filtration media KOR48. It is specifically designed to oxidize gaseous pollutants associated with cooking odors.

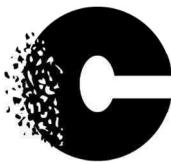
This blended media is ideally suited for odor control in restaurants and other facilities where cooking odors are found.

Physical Properties

| | |
|--------------------------------------|-------------------|
| BULK DENSITY, LBS/ CU FT. | 45 |
| CTC, Activity % (Activated carbon) | 60 minimum |
| KMnO ₄ , % by weight | 6 % |

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CAMERON GREAT LAKES, INC.
MOLECULAR FILTRATION SPECIALISTS

CGL CP48 - KIx

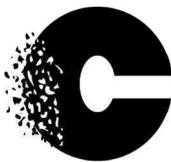
DESCRIPTION:

CP 48-KIx is a bituminous coal based pelletized activated carbon specifically developed for the nuclear industry. Available with KIx, amines or co-impregnated KIx/amines for entrapment of radioactive organo-iodine species from the air.

Physical Properties

| | |
|------------------------------------------------------|----------------|
| ACTIVITY for CCL₄, (ASTM D3467-94) | 60, minimum |
| BULK DENSITY, AVERAGE | 30 lbs / cu ft |
| HARDNESS, (ASTM D3808-79) | 98, min |
| MOISTURE, AS PACKED, (ASTM D2867-95) | 2 % |
| KI CONTENT | 5 % |
| ASH CONTENT, TYPICAL | 10 - 12 % |

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CAMERON GREAT LAKES, INC.
MOLECULAR FILTRATION SPECIALISTS

CGL CC48 - KIx

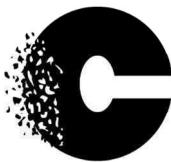
DESCRIPTION:

CGL CC KIx 48- is a coconut shell activated carbon specifically developed for the nuclear industry. Available with KIx, amines or co-impregnated KIx/amines for entrapment of radioactive organo-iodine species from the air.

Physical Properties

| | |
|------------------------------------------------------|----------------|
| ACTIVITY for CCL₄, (ASTM D3467-94) | 60, minimum |
| BULK DENSITY, AVERAGE | 34 lbs / cu ft |
| HARDNESS, (ASTM D3808-79) | 98, min |
| MOISTURE, AS PACKED, (ASTM D2867-95) | 2 % |
| KI CONTENT | 5 % |
| ASH CONTENT, TYPICAL | 2 % |

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CAMERON GREAT LAKES, INC.
MOLECULAR FILTRATION SPECIALISTS

CGL CC - KI₃

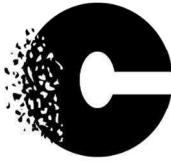
DESCRIPTION: **CGL CC KI3** - is a coconut shell activated carbon specifically developed for the chemisorption of mercury vapor. In addition to a high degree of activation and impregnation this product also offers excellent mechanical strength and a highly developed pore structure.

Physical Properties

| | |
|-----------------------------------------------------------------|----------------|
| ACTIVITY for CCL ₄ , (ASTM D3467-94) (BASE MATERIAL) | 60, minimum |
| BULK DENSITY, AVERAGE | 34 lbs / cu ft |
| HARDNESS, (ASTM D3808-79) | 98, min |
| MOISTURE, AS PACKED, (ASTM D2867-95) | 15 % max |
| KI ₃ CONTENT | 5 % minimum |
| ASH CONTENT, TYPICAL | 2 % |

Product is also available in various mesh sizes, 4 x 6 , 4 x 8, 4 x 10. Custom mesh sizes are available.

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL CP48 -SU

DESCRIPTION:

CP 48-SU is a sulfurized bituminous coal based pelletized activated carbon of high adsorptive capacity . It is specifically designed for the capture of mercury vapors.

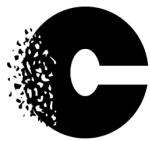
APPLICATIONS:

It is ideally suited for critical applications such as destruction of fluorescent light bulbs, and other mercury containing devices.

Physical Properties

| | |
|-----------------------------------------------------------------|---------------|
| ACTIVITY for CCL ₄ , (ASTM D3467-94) (BASE MATERIAL) | 60, minimum |
| BULK DENSITY, TYPICAL | 35 lbs. cu ft |
| HARDNESS, (ASTM D3808-79) | 98, minimum |
| MOISTURE, AS PACKED, (ASTM D2867-95) | 2 % |
| ASH CONTENT, TYPICAL | 10 - 12 % |
| SULFUR CONTENT, % BY WEIGHT | 10 %, minimum |

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

NUK-TK Nuclear Grade Carbon

STANDARD SPECIFICATION

| | | |
|---------------------------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Activity for CCL ₄ , | ASTM D-3467 | 60%, Minimum |
| Moisture Content, | ASTM D-2867 | 5 %, Maximum |
| Particle Size, | ASTM D-2862/D-5158 | 8X16 US mesh On 6: 0.1% max. On 8: 5% max 8x12: 40-60% 12x16: 40-60% Thru 16: 5% max. Thru 18: 1% max. |

TYPICAL PROPERTIES

| | | |
|-----------------------|-------------|-----------------------------------|
| Hardness, | ASTM D-3802 | 97 |
| Bulk Density, | ASTM D-2854 | .55 g/cm3 |
| Ash Content, | ASTM D-2866 | 3% |
| pH Aqueous Extract, | ASTM D-3838 | 9.2 Minimum |
| % Impregnant | | 2.1 Potassium Iodide 3.1% TEDA |
| Ignition Temperature, | ASTM D-3466 | 330°C |

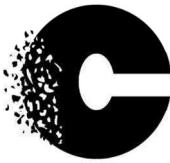
RADIOIODINE REMOVAL EFFICIENCY, ASTM D-3803

50 mm bed depth

| | | | |
|----------------------------|-------|--------|------------|
| Molecular Iodine | 30°C | 95% RH | 99.9% min. |
| Methyl Iodide | 30°C | 95% RH | 97.0% min. |
| Methyl Iodide | 80°C | 95% RH | 99.0% min |
| Methyl Iodide | 130°C | 95% RH | 98.0% min. |
| Molecular Iodine Retention | 180°C | | 99.5% min. |

Unless otherwise specified, particle size distribution will be 5% maximum on the top screen and 5% maximum through the bottom screen.

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL DCL

Eliminates Chlorine

DCL DeActivator™ media is a combination of specially designed **Odor** reducing agents, that are impregnated into a zeolite matrix via a patented process. These reducing agents have strong reduction capabilities in the presence of certain oxidizing compounds, including chlorine, chlorine dioxide, chloramine and peroxides.

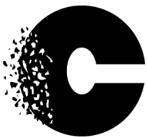
The DeActivator™ is ideally suited for use in the indoor pool environment for the removal of chlorine odors and in any chemical and industrial process where chlorine is present.

Physical Properties

| | |
|----------------------------------------|-----|
| BULK DENSITY, LBS/CU FT AVG | 60 |
| PORE SIZE, ANGSTROMS | 4.0 |
| PORE VOLUME | 15% |
| HARDNESS, MOHS SCALE | 5.1 |

Please contact Cameron Great Lakes, Inc. or your local Distributor for futher information.

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL TRI BLEND CZP

OXIDIZES
ACID GASES

CONTROLS
VOC's

REMOVES
AMMONIA

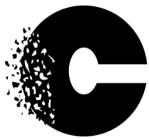
CGLCZP is a special blend activated carbon, specialty carbons and oxidizing media. It is specifically designed to oxidize gaseous pollutants such as hydrogen sulfide, sulfur dioxide, formaldehyde, ethylene, and mercaptans, it effectively remove high molecular weight volatile organic compounds, and reacts to remove ammonia from air streams. This tri blend media is specially formulated for the semiconductor industry to prevent product contamination.

Physical Properties

| | |
|----------------------------------------|------------------------------------------------------------------------------------------------|
| BULK DENSITY, LBS/ CU FT. | 40 |
| CTC, Activity % (Activated carbon) | 60 minimum |
| KMnO ₄ , % by weight (ZK6) | 6 % |
| Removal %, by weight | H₂S- 8 %, NO₂- 1%, SO₂-3.5 %, Nitric dioxide- 2.5% |

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL C/PA/ZK6

OXIDIZES
ACID GASES

CONTROLS
VOC'S

REMOVES
AMMONIA

CGLC/PA/ZK6 is a 33/33/33 blend by weight of activated carbon, phosphoric acid impregnated carbon and CGL's air filtration media ZK6. It is specifically designed to oxidize gaseous pollutants such as hydrogen sulfide, sulfur dioxide, formaldehyde, ethylene, and mercaptans, effectively remove high molecular weight volatile organic compounds, along with ammonia and amine compounds.

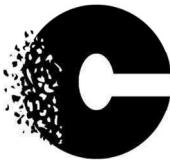
This blended media is ideally suited for use in the semiconductor industry for removal of airborne molecular contaminants.

Physical Properties

| | |
|----------------------------------------|-------------------|
| BULK DENSITY, LBS/ CU FT. | 42 |
| CTC, Activity % (Activated carbon) | 60 minimum |
| KMnO ₄ , % by weight (ZK6) | 6 % |

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL GAC - FR

DESCRIPTION

Granular activated carbon with a well developed pore structure, providing a wide range of molecular adsorption. Media is available in various mesh sizes. This carbon has been specially impregnated with an 84E5, Class B Flame Retardant.

The Flame retardant is odorless and non-toxic.

APPLICATIONS

Controls a wide range of molecular weights making it ideally suited for all general commercial and industrial air filtration applications requiring chemical filtration. This carbon is suitable for use in CGL Honeycomb filters, which provide the end user with an easy to use product and a filter that is easy to dispose

Physical Properties

| | |
|------------------------------------|------------------------------------------|
| Activity for CCL4, (ASTM D3467-94) | 60 minimum |
| Bulk Density, Typical | 30 LBS/ CU FT |
| Moisture content, As Packed | 3 % (typical) |
| Iodine Number, MG/G (ASTM 4607-94) | 1050, Minimum |
| Mesh Sizes | All standard and custom sizes available. |

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

Screen Size Distribution

SSD is the range of screens over which activated carbon is sized. The screen size, or mesh size to be used is determined by a square root of two progression in screen opening, starting with the largest screen used. The US standard sieve sizes are provided (opposite side). The Mean Particle Diameter (MPD) is calculated on the basis of screen size distribution. The weight percent of activated carbon passing through one screen sieve and remaining on the next smaller screen is determined (material on the largest screen and passing through the smallest screen is ignored). The weight fraction is multiplied by the average screen opening for the larger screen and the screen on which the activated carbon was retained. The summation of these fractions is the MPD.

Iodine Number

The amount of Iodine adsorbed by activated carbon from a 0.02N₂/KI aqueous solution. Iodine Number has been roughly correlated to the surface area in pores greater than 10 Å diameter. However, it is best understood as an indicator of total pore volume.

Molasses Number

A measure of the relative decolorization of a boiling molasses solution by activated carbon. The Molasses Number has been interpreted as the surface area available in pores greater than 28 Å diameter. Because molasses is a multicomponent mixture, one must be careful in assigning too strict an interpretation to this parameter.

Apparent Density (AD)

A measure of the mass of carbon that occupies a particular volume. The test is performed by gradually filling a graduated cylinder to 100cc and determining the mass of activated carbon contained. This value, corrected for less efficient settling in the field is used for calculating the amount of activated carbon needed to fill given adsorber volume.

Carbon Tetrachloride Number

Total pore volume indicator. This measured by passing an airstream saturated with CCl₄ at 0°C through a carbon bed held at 25°C. The weight of the CCl₄ adsorbed is determined at prescribed intervals until there is a negligible weight change in the sample.

Hardness Number

Measurement of the mechanical strength of activated carbon. It is the change in weight, expressed as a percentage, of a specific screen size fractions after 3 minutes of vigorous agitation with smooth steel balls.

Abrasion Number

Measurement of the attrition or resistance of activated carbon. This test measures the change in MPD, expressed as a percentage, of a sample after 3 minutes of vigorous agitation with smooth steel balls.

Ash

Inorganic material, primarily aluminum and silicon, contained in activated carbon. Ash is the residual from burning pulverized carbon in air for 3 hours at 1750°F (954°C).

Moisture

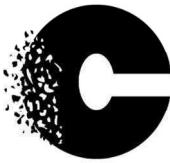
A measure of the water content of carbon. It is determined by boiling activated carbon in xylene using a Dean-Stark trap and condenser. The water is condensed and trapped in a volumetric arm in order to determine the water content. The moisture content of virgin activated carbon can also be estimated on the basis of the weight change that occurs after oven drying at 150°C for 3 hours.

ACTIVATED CARBON PARTICLE SIZE TABLE

To determine approximate mesh size of an activated Carbon sample, check the table below

STANDARD MESH OPENING PARTICLE

| Tyler | U.S. | mm | inches |
|-------|------|-------|--------|
| 4 | 4 | 4.75 | 0.187 |
| 6 | 6 | 3.35 | 0.132 |
| 8 | 8 | 2.36 | 0.094 |
| 10 | 12 | 1.70 | 0.066 |
| 12 | 14 | 1.40 | 0.056 |
| 14 | 16 | 1.18 | 0.047 |
| 16 | 18 | 1.00 | 0.039 |
| 20 | 20 | 0.85 | 0.033 |
| 24 | 25 | 0.71 | 0.028 |
| 28 | 30 | 0.60 | 0.023 |
| 32 | 35 | 0.50 | 0.020 |
| 35 | 40 | 0.425 | 0.017 |
| 42 | 45 | 0.355 | 0.014 |
| 48 | 50 | 0.300 | 0.012 |
| 60 | 60 | 0.250 | 0.0098 |
| 65 | 70 | 0.212 | 0.0083 |
| 80 | 80 | 0.180 | 0.0070 |
| 100 | 100 | 0.150 | 0.0059 |
| 115 | 120 | 0.125 | 0.0049 |
| 150 | 140 | 0.106 | 0.0041 |
| 170 | 170 | 0.090 | 0.0035 |
| 200 | 200 | 0.075 | 0.0029 |
| 250 | 230 | 0.063 | 0.0025 |
| 270 | 270 | 0.053 | 0.0021 |
| 325 | 325 | 0.045 | 0.0017 |
| 400 | 400 | 0.038 | 0.0015 |
| — | 500 | 0.025 | 0.0010 |



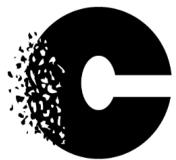
CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CHEMICAL COMPOUND MEDIA SELECTION GUIDE

| CONTAMINANT | MR, CP, CCR, CCS | ZK6 | CI | PA |
|----------------------------|------------------|-----|----|----|
| ACETIC ACID | X | X | X | |
| ACETONE | X | | | |
| ACROLEIN | | X | | |
| ALDEHYDES | X | X | | |
| AMINES | | | | X |
| AMMONIA | | | | X |
| BENZENE | X | | | |
| CHLORINE | X | | X | |
| ETHYL ALCOHOL | X | | | |
| FORMALDEHYDE | | X | | |
| GLUTERALDEHYDE | | X | | |
| HYDROGEN CYANIDE | | X | X | |
| HYDROGEN SULFIDE | | X | X | |
| METHYL ALCOHOL | X | | | |
| MERCAPTANS | X | X | | |
| METHYLENE CHLORIDE | X | | | |
| METHYL ETHYL KETONE | X | | | |
| NITRIC OXIDE | | X | | |
| NITROGEN DIOXIDE | | X | | |
| OZONE | X | | | |
| SULFUR DIOXIDE | | X | X | |
| SULFUR TRIOXIDE | | X | X | |
| TOLUENE | X | | | |
| VOLATILE ORGANIC COMPOUNDS | X | | | |

MEDIA MAY BE COMBINED TO GIVE A BROAD RANGE OF CONTAMINANT REMOVAL CAPACITY.
CONTACT YOUR LOCAL REPRESENTATIVE OR CGL FOR FUTHER TECHNICAL ASSISTANCE.



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

ZK6 Chemical Contaminant Removal Chart

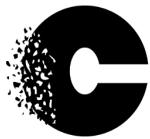
| COMPOUND | Mol. Weight | COMPOUND | Mol. Weight | COMPOUND | Mol Weight |
|------------------|-------------|-------------------|-------------|---------------------|------------|
| Acetaldehyde | 44.05 | ethanol | 46.07 | methylamine | 31.06 |
| acetic acid | 60.05 | ethyl acrylate | 100.11 | Methyl disulfide | 94.19 |
| acetone | 58.08 | ethylene | 28.05 | methyl ethyl ketone | 72.10 |
| acetylene | 26.02 | ethyl mercaptan | 62.13 | methyl mercaptan | 48.11 |
| acrolein | 56.06 | | | Nitrogen Dioxide | 46.01 |
| acrylonitrile | 53.06 | formaldehyde | 30.03 | phenol | 94.11 |
| arsine | 77.93 | formic acid | 46.02 | phosphine | 34.00 |
| | | | | | |
| butadiene | 54.09 | hydrazine | 32.05 | skatole | 131.17 |
| butyl mercaptan | 90.18 | Hydrogen chloride | 36.47 | silane | 32.09 |
| butyric acid | 88.10 | hydrogen cyanide | 27.03 | styrene | 104.14 |
| | | hydrogen sulfide | 34.08 | Sulfur dioxide | 64.07 |
| carbon disulfide | 76.14 | | | Sulfur trioxide | 80.07 |
| 3-chloropene | | isoprene | 68.11 | | |
| cresol | 108.13 | isopropanol | 60.09 | trichloroethylene | 131.40 |
| | | | | triethylamine | 101.19 |
| diethylamine | 73.14 | methanol | 32.04 | trimethylamine | 59.11 |
| dimethylamine | 45.08 | methyl acrylate | 86.09 | | |
| | | | | vinyl chloride | 62.5 |

This list is for guideline purposes only. Effective chemical contaminant removal requires a properly designed filtration system.

Corporate Office

2335 NW 29th Ave. Portland, OR 97210

Phone: (800) 777-4044 Fax: (503) 225-0137



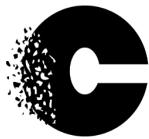
CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

Comparative Media Designations

| Cameron Great Lakes, Inc. | Purafil | Flanders | Application |
|---------------------------|------------|----------|--------------------------------------------------|
| CP48, CCS | Purakol | TS 201 | Standard activated carbon General VOC removal |
| CGL—CI | Puracarb | TS 202 | Acid Gas Removal |
| CGL-PA | Purakol—AM | TS 204 | Amines and Ammonia removal |
| CGL C/ZK6 | CP Blend | TS 209 | Voc removal, acid gas and formaldehyde |
| CGL—ZK6 | Purafil | TS 205 | Formaldehydes, and secondarily acid gas |
| CGL-DCL | Chlorosorb | N/A | Specific for high levels of chlorine |
| CGL-CPSU | N/A | N/A | Mercury removal |

For more specific information on media types, and applications please refer to individual media specification sheets.



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

Permanganate Media Comparison Chart

The chart below shows some comparable data between different permanganate media. When evaluating media it is important to evaluate several different factors. In addition to permanganate content you need to consider media bulk density. A unit requiring 1000 pounds of a Purafil media at 50 pounds per cubic foot, will require 1200 pounds of a ZK-HC high capacity media. This helps to increase media life.

| Media | ZK 6 | Purafil – 4% | Purafil Select 8 % | ZK-HC |
|-----------------------------------------------------|------|--------------|--------------------|-------|
| Bulk Density, lbs/cubic ft. | 60 | 50 | 50 | 60 |
| KMnO₄, % by weight | 6 | 4 | 8 | 7 |
| KMnO₄, grams/cubic ft. | 3.6 | 2 | 4 | 4.2 |
| Hydrogen sulfide, pounds removed / cubic ft. | 6.6 | 5.2 | 7 | 7.7 |

It is ideally suited for the removal of acid gases and formaldehyde.

The CGL ZK-HC media has effectively replaced Permanganate media in numerous applications including, waste water treatment plants, pulp and paper mill, semiconductor facilities, airports and hospital.

Life testing to determine remaining permanganate content is available at the Portland facility.



Permanganate Media Comparison Chart

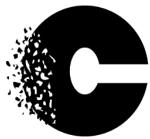
The chart below shows some comparable data between different permanganate media. When evaluating media it is important to evaluate several different factors. In addition to permanganate content you need to consider media bulk density. A unit requiring 1000 pounds of a Pu-rafil media at 50 pounds per cubic foot, will require 1200 pounds of a ZK6 media. This helps to increase media life.

| Media | ZK 6 | 4 % alumina | HS 600 |
|-----------------------------------------------------|------|-------------|--------|
| Bulk Density, lbs/cubic ft. | 60 | 50 | 60 |
| KMnO₄, % by weight | 6 | 4 | 6 |
| KMnO₄, grams/cubic ft. | 3.6 | 2 | 3.6 |
| Hydrogen Sulfide, % removal capacity | 11 | 10.4 | 11 |
| Hydrogen sulfide, pounds removed / cubic ft. | 6.6 | 5.2 | 6.6 |
| Sulfur Dioxide, % removal capacity | 5 | 3.8 | 5 |
| Formaldehyde, % removal capacity | 2.3 | 2.1 | 2.3 |

It is ideally suited for the removal of acid gases and formaldehyde.

The CGL ZK6 media has effectively replaced Permanganate media in numerous applications including, waste water treatment plants, pulp and paper mill, semiconductor facilities, airports and hospital.

Life testing to determine remaining permanganate content is available at the Portland facility.



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

DCL- HS-CL

The chart below shows some comparable data between CGL- DCL and the HS-CL. Both media are sulfate impregnated zeolites, designed for the removal of chlorine and chlorine dioxide.

| Media | DCL | HS-CL |
|------------------------------------|-----------------|--------------------|
| Bulk Density, lbs/cubic ft. | 60 | 60 |
| Impregnate | Ferrous Sulfate | Sodium Thiosulfate |
| %, of impregnate | 4.04 | 4.05 |
| Substrate | Zeolite | Zeolite |
| Flammability | No | No |
| Moisture Content | 14-17 | 15 Avg. |
| Cation Exchange Capacity | Yes | Yes |
| Dusting | Insignificant | Insignificant |



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL ZK6 HC

OXIDIZES
ACID GASES

CONTROLS ODOR

OFFERS MORE
KMnO₄

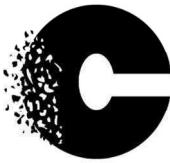
LESS DUST
FOR EASY HANDLING

ZK6 HC is an air filtration media specifically designed to oxidize gaseous pollutants such as hydrogen sulfide, sulfur dioxide, formaldehyde, ethylene, and mercaptans.

This unique media is ideally suited for corrosion control and protection of electronic process controls in industrial environments; odor abatement in sewerage treatment facilities and odor and control in public buildings. It provides superb protection of perishable commodities in the fresh food industry.

ZK6 -HC is made from a unique aluminosilicate compound possessing significant molecular sieve sorption capacity and is impregnated with 7% potassium permanganate.

| | |
|---------------------------------------|-------------------|
| BULK DENSITY, LBS/ CU FT. | 60 average |
| PORE SIZE, ANGSTROMS | 4.0 |
| Physical Properties | |
| HARDNESS, MOHS SCALE | 5.1 |
| KMnO ₄ , PERCENT BY WEIGHT | 7% |
| SPECIFIC SURFACE AREA, SQ.YDS./OZ. | 1357 |



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL MR

DESCRIPTION:

CGL MR is a remanufactured coconut shell and bituminous coal based activated carbon. It has a broad pore structure range providing a wide range of molecular adsorption.

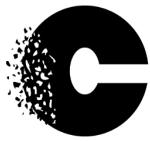
APPLICATIONS:

It controls a wide range of molecular weights making it ideally suited for applications including, wastewater treatment, spill control and clean up, and general odor control.

Physical Properties

| | |
|-------------------------------------------------|------------------|
| ACTIVITY for CCL ₄ , (ASTM D3467-94) | 55 - 65 |
| BULK DENSITY, TYPICAL | 30 lbs / cu ft |
| MESH SIZES, US STANDARD SERIES, (ASTM D2862-92) | 4x8, 8x30, 12x40 |
| MOISTURE, AS PACKED, (ASTM D2867-95) | 2 % |

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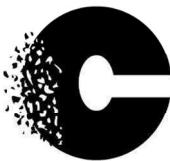


Permanganate Media Capacity Chart

| Property | |
|--------------------------------------|-----|
| Bulk Density, lbs/cubic ft. avg. | 60 |
| KMnO ₄ , % by weight | 6 |
| Hydrogen Sulfide, % removal capacity | 11 |
| Sulfur Dioxide, % removal capacity | 5 |
| Nitric Oxide, % removal capacity | 2-3 |
| Formaldehyde, % removal capacity | 2.3 |

The numbers above are based on a specific contaminant. Multiple contaminants can affect the capacity.

Life testing to determine remaining permanganate content is available at the Portland facility.



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

BULK MEDIA FOR LIQUID PHASE APPLICATIONS

Acid Washed Media : CGL acid washed media is suitable for use in food and pharmaceutical applications, purification of acids, caustic liquors, plasticizers, soda ash and fatty acids.

- **CG83AW**: Coal granular 8 x 30 mesh acid washed carbon.
- **CG124AW**: Coal granular 12 x 40 mesh activated carbon.

Bituminous Coal Based Media: Coal based carbon with a broad well developed pore structure suitable for controlling a wide range of molecular weights, making it ideally suited for applications including, wastewater treatment, spill control and clean up.

- **CG124**: Coal granular 12 x 40 mesh activated carbon.
- **CGR83**: Reactivated coal granular 8 x 30 mesh activated carbon.

All Purpose Activated Carbons: Fine mesh activated carbons coarser than powdered activated carbon providing better flow and improved filtration rates.

- **MR3150**: Activated carbon 30 x 150 mesh.
- **MR50**: Activated carbon > 50 mesh.

Specialty Liquid Phase Media:

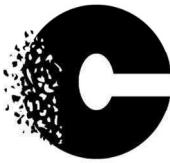
- **CCS-AG**: High activity silver impregnated coconut shell carbon, designed to reduce microbial growth in high grade water treatment applications.
- **OMZ Organo Sorbant**: A modified alumino silicate designed to absorb anions such as chromate, selenate, sulfate, hydrocarbons, heavy metals and various petroleum products from waste streams.
- **Z100**: Alumino-silicate based natural mineral having desirable selective ion exchange and adsorption properties, suitable for removing ammonia from wastewater, radionuclides from radioactive waste, and toxic and heavy metal from industrial process water and wastewater.

Media Packaging Options

5 Gallon Pails: 20 pounds (0.67cf³)
Boxes.....: 30 pounds (1.0 f³)
Bags.....: 50 pounds (1.8cf³)

14 Gallon Drums.: 50 pounds (1.67 cf³)
55 Gallon Drums.: 200 pounds (6.67 cf³)
Bulk Super Sacks: 1000 pounds (33.34 cf³)

Weights above are based on a media density of 30 pounds per cf³. Packages will accommodate more weight with media of heavier densities. See individual specification sheets for actual media bulk density.



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL CG830AW

DESCRIPTION

Bituminous Coal Based activated carbon specially produced with a broad, well developed pore structure to enhance the adsorption of color bodies and organic impurities from process streams. CGL/GAC83A is acid washed to lower the leachable metals and for pH adjustment.

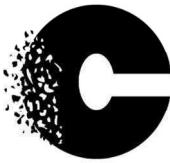
APPLICATIONS

It is suitable for use in food and pharmaceutical applications, purification of acids, caustic liquors, plasticizers, soda ash and fatty acids.

Physical Properties

| | |
|-----------------------------------------------------------------------------------|--------------------------------------|
| US STANDARD SIEVE SIZE: 8 x 30 GREATER THAN NO. 8 LESS THAN NO. 30 | 15 %, MAXIMUM 4%, MAXIMUM |
| MOLASSES NUMBER | 240 AVERAGE |
| BULK DENSITY | 30 LBS/ CU FT, AVG. |
| MOISTURE CONTENT (ASTM-D2867-95) | 2 %, AS PACKED |
| ABRASION NUMBER, RO-TAP | 80, AVERAGE |
| IODINE NUMBER, MG/G (ASTM D4607-94) | 920, MINIMUM |
| ASH CONTENT | 8% |

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL GAC124A

DESCRIPTION

Bituminous Coal Based activated carbon specially produced with a broad, well developed pore structure to enhance the adsorption of color bodies and organic impurities from process streams. CGL/GAC124A is acid washed to lower the leachable metals & for pH adjustment.

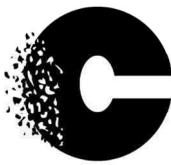
APPLICATIONS

It is suitable for use in food and pharmaceutical applications, purification of acids, caustic liquors, plasticizers, soda ash and fatty acids.

Physical Properties

| | |
|----------------------------------------------------------------------------|-----------------------------|
| US STANDARD SIEVE SIZE: 12 x 40 GREATER THAN NO. 12 LESS THAN NO. 40 | 15 % MAXIMUM 4 % MAXIMUM |
| MOLASSES NUMBER | 240 AVERAGE |
| BULK DENSITY | 30 LBS/CU FT, AVG. |
| MOISTURE CONTENT, (ASTM-D2867-95) | 2 %, AS PACKED |
| ABRASION NUMBER, RO-TAP | 80, AVERAGE |
| IODINE NUMBER, MG/G(ASTM D4607-94) | 920, MINIMUM |
| ASH CONTENT | 8 % |

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL CG83

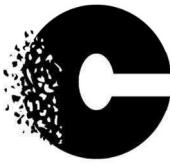
DESCRIPTION: CG83 is a bituminous coal base activated carbon. It has broad pore structure range providing a wide range of molecular adsorption.

APPLICATIONS: It is capable of controlling a wide range of molecular weights making it ideally suited for applications including, wastewater treatment, spill control and clean up.

Physical Properties

| | |
|-------------------------|---------------------------------|
| Mesh Size: | 8x30 |
| Total Surface Area: | $\geq 950 \text{ m}^2/\text{g}$ |
| Bulk Density: | 0.49 - 0.54 g/cc |
| Iodine Number, minimum: | >975 mg/g |
| Average Diameter: | 0.8 - 1.0 mm |
| Hardness Number: | >75 |
| Moisture, as packed: | <2 % |
| Grain Diameter: | 1.5 - 1.7 mm |

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL CGR83

DESCRIPTION:

CGR83 is a remanufactured bituminous coal base activated carbon. It has broad pore structure range providing a wide range of molecular adsorption.

APPLICATIONS:

It is capable of controlling a wide range of molecular weights making it ideally suited for applications including, wastewater treatment, spill control and clean up.

Physical Properties

| | |
|----------------------|---------------------------------|
| Mesh Size: | 8x30 |
| Total Surface Area: | $\geq 950 \text{ m}^2/\text{g}$ |
| Bulk Density: | 0.49 - 0.54 g/cc |
| Iodine Number: | >900 mg/g |
| Average Diameter: | 0.8 - 1.0 mm |
| Hardness Number: | >75 |
| Moisture, as packed: | <2 % |
| Grain Diameter: | 1.5 - 1.7 mm |

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL CG124

DESCRIPTION:

CGR12 x 40 is a bituminous coal base activated carbon. It has broad pore structure providing a wide range of molecular adsorption.

APPLICATIONS:

It is capable of controlling a wide range of molecular weights making it ideally suited for applications including, wastewater treatment, spill control and clean up.

Physical Properties

| | |
|-------------------------------------------------------------------|-----------------------------|
| US Standard Sieve Size 12 x 40 Greater than 12 Less than 40 | 15 % maximum 4 % maximum |
| Molasses Number: | 240 average |
| Bulk Density: | 30 lbs / cu. ft. average |
| Abrasion Number, RO-TAP: | 80, average |
| Moisture Content, (ASTM D2867-95) | 2 %, as packed |
| Iodine Number, mg/g (ASTM D4607-94) | 1000, minimum |

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL CGR124

DESCRIPTION:

CGR12 x 40 is a bituminous coal base activated carbon. It has broad pore structure providing a wide range of molecular adsorption.

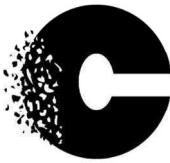
APPLICATIONS:

It is capable of controlling a wide range of molecular weights making it ideally suited for applications including, wastewater treatment, spill control and clean up.

Physical Properties

| | |
|----------------------|---------------------------------|
| Mesh Size: | 12 x 40 |
| Total Surface Area: | $\geq 950 \text{ m}^2/\text{g}$ |
| Bulk Density: | 0.49 - 0.54 g/cc |
| Iodine Number: | >900 mg/g |
| Average Diameter: | 0.85 mm |
| Hardness Number: | >75 |
| Moisture, as packed: | <2 % |
| Grain Diameter: | 1.5 - 1.7 mm |

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL MR50

DESCRIPTION:

CGL/MR50 is a quality, fine meshed activated carbon. It is coarser than AC's and flows better accordingly. This coarse characteristic also provides improved filtration rates.

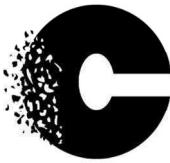
APPLICATIONS:

All purpose.

Physical Properties

| | |
|-------------------------------------|--------------------|
| APPARENT DENSITY, G/CC | 0.45 |
| MOISTURE CONTENT, AS PACKED | 5% MAXIMUM |
| MOLASSES NUMBER | 210 MINIMUM |
| IODINE NUMBER, MG/G (ASTM D4607-94) | 850 MINIMUM |
| ASH CONTENT, MAXIMUM | 12% |

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL MR3150

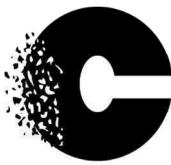
DESCRIPTION: CGL/MR3150 is a quality, fine meshed activated carbon. It is coarser than PAC's and flows better accordingly. This coarse characteristic also provides improved filtration rates.

APPLICATIONS: All purpose.

Physical Properties

| | |
|-------------------------------------|--------------------|
| APPARENT DENSITY, G/CC | 0.45 |
| MOISTURE CONTENT, AS PACKED | 5% MAXIMUM |
| MOLASSES NUMBER | 210 MINIMUM |
| MESH SIZE, TYPICAL | 30 x 150 |
| IODINE NUMBER, MG/G (ASTM D4607-94) | 850 - 950 |
| ASH CONTENT, MAXIMUM | 12% |

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CGL CCS—Ag

DESCRIPTION

High activity silver impregnated coconut shell carbon. It is available in a variety of mesh sizes, including 8 x 30, 12 x 40, and 20 x 50.

APPLICATIONS

Specifically designed to reduce bacterial growth in high grade water treatment applications. Ideal for use in the under-the counter drinking water filters or any application that requires taste & odor removal combined with bacteria control.

Physical Properties

| | |
|-------------------------------------------------|----------------------|
| Activity for CCL ₄ , (ASTM D3467-94) | 60 % minimum |
| Bulk Density, Typical | 29 LBS/ CU FT |
| Silver Content | 0.01— 0.05 % (as Ag) |
| Ball Pan Hardness, (ASTM D3802-79) | 99, Minimum |
| Iodine Number, MG/G (ASTM 4607-94) | 1050, Minimum |
| Ash Content, Maximum | 3% |

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CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

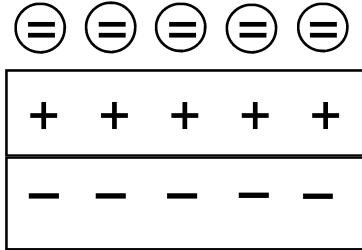
CGL OMZ*

OMZ* Organo Sorbant is a patented, modified alumino silicate that is designed to absorb anions such as chromate, selenate, sulfate, hydrocarbons (such as benzene, toluene, and xylene), heavy metals (such as lead and cadmium), and various petroleum products (such as oil) from aqueous waste streams.

| APPLICATIONS | CONTAMINANTS REMOVED |
|------------------------------------------|------------------------------------------------------------------------------------------|
| Groundwater | diesel fuel, gasoline, oils, PCB's BTX, heavy metals, perchloroethylene, trihalomethanes |
| Manufacturing Process Water | oil, grease |
| Paint Stripping | solvents, heavy metals |
| Electroplating | heavy metals |
| Wood Treating | pentachlorophenol, creosote |
| Produced water from oil production wells | oil, diesel fuels |

How OMZ Works

The basic concept involves imparting hydrophobicity to the base alumino silicate. To do this, the alumino silicate substrate is coated with a strongly bound hydrophobic compound. Other hydrophobic chemicals, such as hydrocarbons, prefer to combine with the surface-modified particles rather than maintaining suspension in water. The treated alumino silicate also absorbs inorganic oxyanions such as chromate, selenate and sulfate while maintaining its natural sorption capacity for heavy metals. The diagram below illustrates the concept of how OMZ works. The base media of OMZ is CGL type Z100, an alumino silicate with an exceptional cation exchange capacity. The modifying agent is HDTMA - a strong cation that replaces other cations on the surface of Z100 producing a surface anion exchanger.





CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

Why OMZ is Superior to Tailored Clays

Tailored clays have been used successfully for a number of years to adsorb organic contaminants. OMZ, because it is not a clay medium but an alumino silicate, is a better alternative. When water passes through a clay medium, the clay particles expand reducing the interparticle space and lowering the permeability of the clay medium. Indeed, the tailoring process itself, due to coagulation of the tailoring agent, may cause a further reduction of permeability. The OMZ alumino silicate is a large network of open channelways similar to a sponge with uniform holes and a high cation exchange capacity. Unlike clay particles, this structure is rigid and stable (even under aqueous conditions) allowing more contaminants to be adsorbed in its open channelways.

| DESCRIPTION | PROPERTIES OF OMZ |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Buff or off-white granules of an alumino-silicate base modified with a quaternary ammonia compound. Standard particle sizes are 6 x 14 mesh or 4 x 6 mesh. | Cation exchange capacity 2.20 meq/g Bulk density (treated) 55 lbs/cu ft. Hardness Mohs scale 5.1 Pore size 4.OA Thermal stability 1202° F Specific surface area 40 sq. m/g Crushing strength 2500 lbs/sq. in |
| STANDARD PACKAGING | |
| <ul style="list-style-type: none"> • 100 Pound Fiber Drums • 400 Pound Fiber Drums • 80 Pound Bags • 2000 Pound Super Sacks | |

OMZ can be effective in the removal of the following contaminants from waste streams:

ORGANIC CONTAMINANTS

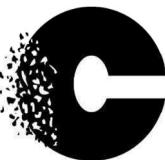
| | |
|---------------|-----------------------|
| anthracene | napthalene |
| benzene | non-ionic surfactants |
| chloroform | penenthrene |
| creosote | oil |
| ethyl benzene | pentachlorophenol |
| diesel fuel | perchloroethylene |
| flourene | pyrene |
| fulvic acids | solvents |
| grease | toulene |
| humic acids | total organic carbons |
| (TOC's) | trihalomethane |
| indeno pyrene | |

HEAVY METALS

| | |
|----------|-----------|
| aluminum | magnesium |
| antimony | manganese |
| arsenic | mercury |
| barium | nickel |
| cadmium | selenium |
| calcium | silver |
| chromium | tin |
| cobalt | zinc |
| copper | |
| iron | |
| lead | |

Information herein is accurate to the best of our knowledge. Suggestions are made without warranty or guarantee of results. Before using, buyer should determine the suitability of the product for its intended use, and buyer assumes the risk and liability in connection therewith. OMZ presents no health hazards when shipped, stored, and handled properly. Please refer to our Material Safety Data Sheet for more complete information.

Page 2 of 2



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MOLECULAR FILTRATION SPECIALISTS

Z100 NATURAL ZEOLITE FILTRATION MEDIA

DESCRIPTION

Buff or off-white granules of an alumino-silicate based natural mineral. Standard particle sizes are 4 x 6 mesh and 6 x 8 mesh. Custom mesh sizes available.

APPLICATIONS

Natural zeolites have desirable selective ion exchange and adsorption properties. Clinoptilite, such as CGL Z-100, can be used for removal of the following:

- radionuclides from radioactive wastewater
- ammonia from wastewater
- toxic & heavy metals from industrial process water and wastewater (e.g. metal finishing & secondary metals operations).

Z-100 can be effective in the removal of the following metals from aqueous solutions:

| | | | | |
|----------|-----------|-----------|---------|---------|
| aluminum | Antimony | arsenic | barium | cadmium |
| calcium | chromium | cobalt | copper | iron |
| lead | magnesium | manganese | mercury | nickel |
| selenium | silver | tin | zinc | |

Note—The selectivity of zeolite for metals depends on numerous factors including the hydration, channel dimensions, and exchangeable cation composition of the zeolite and the pH, temperature, composition and concentration of the solutions to be treated. A bench “jar” test or pilot study is highly recommended.

PROPERTIES OF Z-100

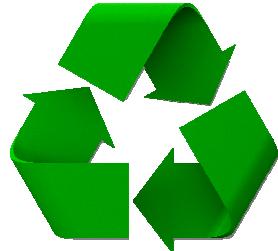
| | |
|--------------------------|----------------|
| Cation exchange capacity | 2.20 meq/g |
| Bulk density (treated) | 55 lbs/cu ft |
| Hardness Mohs scale | 5.1 |
| Pore size | 4.0A |
| Thermal Stability | 1202° F |
| Specific surface area | 40 sq m/g |
| Crushing strength | 2500 lbs/sq in |

This information has been gathered from standard reference materials and/or test procedures and is believed to be true and accurate. It is offered solely for your consideration and verification. None of the information presented shall be construed as constituting a warranty or representation, expressed, written, or implied, for which we assume legal responsibility or that the information or goods described is fit for any particular use either alone or in combination with other goods or processes, or that its use does not conflict with existing patent rights. No license is granted to infringe on any patent rights or practice any patent invention.



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS



CARBON REACTIVATION

How it makes cents!



For many years the low cost of carbon and the high cost of energy made reactivation less attractive than disposal. With carbon prices rising over 50% in the past couple of years reactivation has now become an economically sound option.



Here are just a few benefits to recycling your spent carbon:

COST SAVINGS:



Reactivation: Send your spent carbon back to our facility for regeneration, you save the disposal cost.

Custom remanufacturing: Send us your spent carbon for remanufacturing for your own reuse., you pay for the reactivation service.

The above programs require minimum quantities.



LEED CERTIFICATION:

Recycling your carbon by remanufacturing helps your clients with Leed Certifications by reducing the amount of waste they send to the landfill.

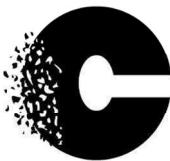


Now is the time to be environmentally and economically conscious. In many applications the use of remanufactured carbons will be as effective at molecular filtration as will a virgin carbon.



Please call or email at us to discuss setting up a reactivation program for your used carbons.





CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

Approval Date: _____ Approval Number: _____

Approval By: _____ Title: _____

TO BE COMPLETED FOR EACH SHIPMENT OF SPENT HVAC CARBON

1. Customer Information:

- a. Company Name: _____
- b. Company Address: _____

- c. Representative's Name: _____
- d. Representative's Title: _____
- e. Telephone Number: _____
- f. Fax Number: _____
- g. Anticipated Shipping Date: _____
- h. Purchase Order Number: _____

2. Spent Carbon Information:

- a. Quantity (by volume or weight): _____
- b. Shipping container type: _____
- c. Number of shipping containers: _____
- d. Number of Filters Spent Carbon Originated From: _____
- e. Number of Companies Generating Spent Carbon: _____
- f. Has the spent carbon been used in HVAC systems only? YES ____ NO ____
- g. Has the spent carbon been used in air filters that are piped directly to any industrial or chemical process? YES ____ NO ____
- h. Does the Spent carbon contain any chlorinated or toxic chemicals? YES ____ NO ____
- i. Are there any known hazards associated with this spent carbon that CGL should consider in handling? YES ____ NO ____

3. Customer Certification

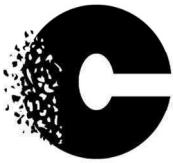
I hereby certify that to the best of my knowledge, all information submitted in this document is true and accurate and that all known or suspected chemical contaminants and potential hazards have been disclosed.

Signature

Title

Name (typed or printed)

Date



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

Approval Date: _____ Approval Number: _____

Approval By: _____ Title: _____

SPENT CARBON PROFILE FORM

A. **Generator Information**

1. Generating Facility: _____
2. Site Address:

3. EPA I.D. Number _____
Is this a SUPERFUND site? YES _____ NO _____
4. Generator Technical Representative: _____
5. Phone No.: (____) ____ - ____ Title: _____
Fax No.: (____) ____ - _____
6. Generator Business Representative: _____
7. Phone No.: (____) ____ - ____ Fax No.: (____) ____ - _____

B. **Cameron Great Lakes Distributor Information(if applicable)**

1. Distributor Name: _____
2. Distributor Representative: _____
3. Phone No.: (____) ____ - ____ Fax No.: (____) ____ - _____
4. Who is Cameron Great Lakes to contact regarding this form?
 A-4 above
 B-2 above
 Other Name: _____
Company: _____
Phone No.: (____) ____ - ____ Fax No.: (____) ____ - _____

REQUIRED: Ship Amt: _____ Distributor PO# _____

Generator Certification

I hereby certify that to the best of my knowledge, all information submitted in this and all attached documents is true and accurate, and that all known or suspected chemical contaminants and potential hazards have been disclosed.

Signature _____ Date _____

Name (type or print) _____ Title (type or print) _____

C. Spent Carbon Identification

1. Describe the carbon treatment system and detail the source of, or process which created the contaminants that are on this carbon (examples; system filtering gasoline leaking underground storage tank, wastewater treatment for spent solvent used for degreasing printed circuit boards, ground water cleanup of spilled chemical from drum storage area, air filtration of office building, waste water treatment from a municipal sewage plant, etc.):

D. Spent Carbon Hazardous Characterization

Questions 1a, 2a, & 3, must be answered. If the answer to part (a) is "no" you need not complete the rest of that particular question.

- 1A. Is the spent carbon a Hazardous Waste as defined by U.S. EPA regulations under the Resource Conservation and Recovery Act(RCRA) as set forth in 40 CFR, Part 261?

_____ YES _____ NO

- 1B. If "yes", list U.S. EPA Hazardous Waste Code(s):

- 2A. Is the spent carbon a Hazardous Waste as defined by your State's regulations? _____ YES _____ NO

- 2B. If "yes", list Generator State's waste code(s):

3. Generator's State Agency Information:

Agency Name: _____

Agency Address: _____

E. Spent Carbon Handling Instructions

1. Required personal protection equipment or special handling instructions?

2. Do you have MSDS(s) for all contaminants in influent stream or on spent carbon?

_____ YES _____ NO Please attach to original copy of this form.

Call "Profile Form Assistance" at **800-777-4044** with any questions.

Mail Signed Original to:

Cameron Great Lakes

2335 NW 29TH Ave.

Portland, OR 97210

This form and lab analyses (without MSDS's) may be faxed to

503-225-0137

to expedite the approval process.



Media Analysis Report

| | | | | | | | | |
|----------------------------|------|--|--|--|--|--|--|--|
| Client | Date | | | | | | | |
| Reference | | | | | | | | |
| Installation Date | | | | | | | | |
| Sample ID | | | | | | | | |
| Butane Activity | | | | | | | | |
| CTC number - calculated | | | | | | | | |
| % Life Remaining | | | | | | | | |
| pH | | | | | | | | |
| % Life Remaining | | | | | | | | |
| KMnO ₄ % | | | | | | | | |
| % Life Remaining | | | | | | | | |
| Life remaining, months (1) | | | | | | | | |
| Re test recommended | | | | | | | | |

Carbon is considered spent when CTC is 15, change out is recommended at 25.

CI carbon is considered spent @ 7.5 in critical applications 8.5.

PA carbon is considered spent @ 6.5, in critical applications 5.0.

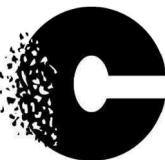
Permanganate is considered spent @ 1.2, change out is recommended at 1.6.

In the case of a blended media the remaining service time is calculated based on the lowest percentage of life remaining between the two media.

Note (1) Calculated only when installation date is provided:

Permanganate % by wt.

| | |
|------------|--------------------|
| 2.2 to 6.0 | Safe |
| 2.2 to 1.6 | Boderline |
| 1.6 to 1.2 | Change |
| 1.2 to 0.0 | Change Immediately |



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

Molecular Filtration: Principles and Design Parameters

The two principal methods of molecular filtration used in the commercial and industrial sectors are adsorption and chemisorption. While there are other methods available to remove contaminants from air streams they are generally more specialized and are not incorporated into an HVAC system; therefore they will not be addressed in this paper.

Adsorption is the process by which one substance is attracted and held onto the surface of another. It is a surface phenomenon. **Capacity is independent of particle size and the adsorption rate is inversely proportional to particle size.** Adsorption is generally associated with activated carbon, however there are other media, for example zeolites, used as well. There are numerous types of activated carbon, generally designated by its source, i.e. coal, coconut, wood, and several others. These various carbons come with different properties, including pore structure, pore distribution, and hardness to mention a few. The choice of a carbon in a given application is dependent upon a number of factors, which will be reviewed later.

Chemisorption is a chemical reaction on and in the surface of the adsorbent; it is fairly specific and depends upon the nature of the media and the contaminant. It is irreversible and essentially instantaneous. Chemisorption is associated with chemically treated activated carbons and potassium permanganate impregnated media. Chemically treated activated carbons are fairly specific for a compound or a chemical family. They also offer the added benefit of maintaining the adsorptive properties of an untreated activated carbon, thus making it a very versatile product, in an air stream where only one contaminant family requires the use of a chemically treated carbon. Potassium permanganate media is a much broader based oxidant. For example you would be capable of cleaning an air stream containing both formaldehyde and acid gases with a potassium permanganate media, whereas it would require two different chemically treated carbons.

In order to understand some of the design criteria it is important to review some of the terminology used in association with molecular filtration.

CONTACT EFFICIENCY (E):

- The percentage of total contaminant molecules which have come into contact with the media.
- For (E) to approach 100 % the residence time must be around 0.07 seconds.

RESIDENCE TIME:

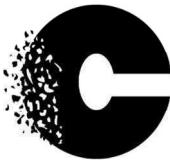
- The time it takes air to cross a distance equal to the thickness of the filter (or media bed depth) without accounting for the resistance of the media through which it travels.

REMOVAL EFFICIENCY:

- The fraction of the contaminant that, once in contact with the media, is removed by either physical or chemical means.

REMOVAL CAPACITY:

- The amount of the contaminant removed over the useful life of the media.



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DESIGN CONSIDERATIONS

Contaminant(s) & Concentration: This is necessary for the proper selection of media. The more specific the information the easier the selection. In many industrial applications this information is often readily available, however in commercial air quality situations it is much more arbitrary. In these instances one generally knows the source and from that can determine the contaminants that are most likely present.

Temperature & Humidity: Activated carbons and potassium permanganate media are not recommended for use in air streams with temperatures greater than 120°F. At relative humidities greater than 60% activated carbon will begin to adsorb water, somewhat decreasing its capacity for contaminants. This generally doesn't pose major problems, unless the humidity is very high and you have 100 % outside air.

Air Volume: When designing a system it is noted from above that we need a minimum amount of time (residence time) to effectively remove a contaminant. The volume of air being treated is critical to the design of the system.

Pressure Drop: The pressure at the given velocity must be within the capacity of the blower. This is often a problem when retrofitting an existing air handling unit that was not designed to accommodate the additional filter bank. The pressure drop of a carbon/permanganate filter bed does not increase with time. The exception to this are the disposable impregnated media filters using a non woven polyester or similar material that will remove particulate in addition to gases. In this instance in addition to the initial resistance one would need to know the filters rated final resistance. Note that carbon and permanganate filter beds should be protected with a particulate filter to protect the media from particulate contamination.

Removal Efficiency: We know that the removal efficiency required is different depending upon the application. In some critical application such as semiconductor or computer control rooms, high efficiency is required. Designing high efficient filters requires more detailed information on the exact contaminants and concentrations, whereas when designing for a commercial light odor complaint, one need only to drop the contaminant below it's odor threshold which may not require the same level of efficiency on a one pass. It is also important to remember that the efficiency of the filters will decrease with time.

Removal Capacity: Capacity will determine life of the filters and thus also affects filter selection. The type and concentration of contaminants in the air stream determine the capacity of the filter. One would not want to design a system with too short a life thus increasing maintenance/service costs.

Having the above information allows one to design a system that meets the requirements in a given application. There are a few other items to consider when designing and selecting a filter system and that involves maintenance and service. Access and location of the system may cause one to select a filter of a different size or weight to accommodate service personnel.

As with most filtration applications the more information you have, the more knowledgeable you are as to your customer's goals, the better you can design a system to meet all his needs. In many applications, some of the above information will be limited, thus it becomes critical to rely on similar installations and market knowledge of applications.



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MOLECULAR FILTRATION SPECIALISTS



A Guide to Airport Air Quality

Jet fumes consists of both high and low molecular weight contaminants. Activated carbon is the product of choice for high molecular weight contaminants, whereas potassium permanganate is best used for low molecular weight contaminants. Based on this, the product of choice is a blend, however the decision as to the best product to use is based upon many factors including contaminants present, levels of contaminants and economics. The goal is to reduce contaminants below their respective odor and health thresholds so as to protect the occupants and create a good working environment.

Activated carbon is often times used alone in several airport applications and has been found to be sufficient. For example O'Hare Airport uses only activated carbon. The benefits to using just carbon is that it can be reactivated and saves disposal costs, therefore large installations using refillable panels tend to strictly use carbon. While the blend might remove more of the lower molecular weight contaminants it has been found that the straight carbon removes enough to sufficiently achieve the desired goal.

A system with potassium permanganate alone is not recommended for both economics and performance.

The choice therefore lies between activated carbon and a blend of carbon and permanganate. In disposable filter applications where reactivation is not an option a blend selection of choice. It will effectively remove more of the contaminants present at an airport location than will a straight activated carbon filter.



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MOLECULAR FILTRATION SPECIALISTS

AIR QUALITY IN COMMERCIAL BUILDINGS



Air quality in a commercial building is affected, not only by the activities in the building, it is highly affected by those activities surrounding the building. If your building is located near an airport, a busy highway, or an industrial complex, the chances are very good that your indoor air quality is adversely affected. The number of unhealthy contaminants that are released into the air from these sources is well documented. Many of the contaminants present from these sources have a very low odor threshold, meaning that one can detect them at very low levels.

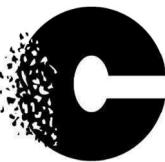
Unpleasant odors can have a negative effect on building occupants. Poor air quality for a business can result in low productivity and absenteeism. For the building owner it can mean loss of unsatisfied tenants.

Your surroundings need not dictate the air quality in your building. You can improve your building air quality with the use of both good particulate filters and filters designed to remove airborne molecular contaminants. A carbon or carbon/permanganate disposable filter is ideal in this situation.

The goal is to reduce contaminants below their respective odor and health thresholds so as to protect the occupants and create a good working environment.

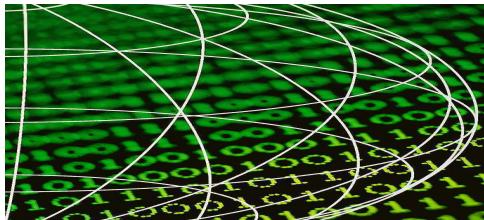
A proactive building owner can prevent problems before they cause a loss of revenue.

We recommend contacting a N.A.F.A. Certified Air Filter Specialist. They can provide a cost effective and quality solution for all your filtration needs.



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS



Cleanroom Solutions

Don't let airborne molecular contaminants affect production at your facility. At Cameron Great Lakes, Inc. we design solutions to fit your specific needs. Whether your requirement be for disposable filters or refillable cells we have the most economical solution for your need. Our versatile Vapor Trap Disposable V-Bank can be retrofitted into units offering as little as 4" in depth, without compromising life or performance.

Whether your contaminants be internally generated or introduced from outside air we can provide the specialty media necessary to remove them.

Depending upon your circumstances we can provide a downstream dusting/polishing filter consisting of a non woven fiber impregnated with activated carbon. Other particulate media filters are also available.

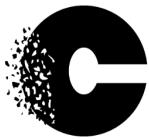
INSTALLATIONS

- Intel , Santa Clara, CA
- Western Digital, CA
- Lockheed Martin - Sunnyvale, CA
- Cypress Semiconductor, MN
- Advanced Micro Devices, Austin, TX
- Freescale (Motorola), Chandler, AZ
- Freescale (Motorola), Austin, TX
- Micron, Boise, ID
- Samsung, Austin , TX
- UMC, Taiwan

TARGET GASES

- Acetone
- Amines
- Ammonia
- Arsine
- Boron trifluoride
- Chlorine
- Hydrogen Chloride
- Hydrogen Sulfide
- Hydrofluoric acid
- Isopropyl Alcohol
- Phosphine
- Sulfur Dioxide

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MOLECULAR FILTRATION SPECIALISTS

A Guide to Hospital Air Quality



The Challenge

Maintaining a high quality of air is difficult for all building operators, however when operating in a critical environment such as a hospital, maintaining air quality is a necessity.

Knowing how to provide a proper environment means understanding what problems and potential pollution sources you are up against. One must not only watch for internally generated pollutant sources but must be careful of external pollutant sources. These internal pollutants are often generated by the process and require removal as the effect on the end product may be detrimental. Often times to control internal pollutants, more outside air is introduced to the space. While this might be an acceptable control measure for some buildings, for a critical process it could introduce more potentially harmful contaminants that will ultimately damage your end products or affect test results. In urban areas, outdoor peak levels of ozone, sulfur dioxide, nitrogen dioxide, and hydrocarbons are often 40% to 100% above allowable limits. Hospital with helipads present an even further challenge in that the pad is often on the rooftop near air inlets which then draw in the contaminants of the burning fuel.

The Solutions

To ensure that air quality is acceptable for both occupants and employees, molecular filtration is your best option. When selecting a molecular filtration system there are numerous options available in both types of adsorbent/chemisorbent media along with the hardware that holds the media. The best selection for your particular application will depend upon a variety of factors.

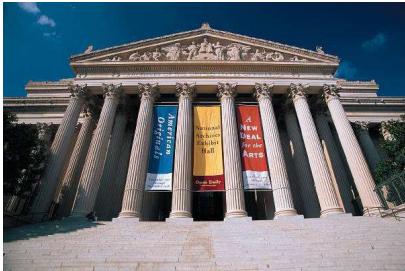
When looking into a molecular filtrations system, items to be taken into consideration include physical space, ease of maintenance, types of contaminants present and concentration, temperature and humidity and the amount of air to be treated. You generally have two choices of media, a standard activated carbon or a blend of carbon and potassium permanganate. The standard activated carbon system will remove ozone, nitrogen dioxide and your higher molecular weight volatile organic compounds. These systems have been successfully used over the years and give you the benefit of regeneration. However, often times there are also many other low molecular weight contaminants present. In this case it is often necessary to combine the carbon with potassium permanganate. The potassium permanganate readily reacts with the low molecular weight contaminants removing them from the air stream giving you an adsorption/chemisorption system that can effectively provide the proper protection you require.

Your molecular filtration specialist at Cameron Great Lakes can assist you in the proper selection of both hardware and media that will be most efficient both in performance and economics. (Please note that this guide offers information on removal of chemical contaminants only.)



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS



The Challenge

Maintaining a high quality of air is difficult for all building operators, however museums pose an even more challenging situation.

Museum operators are faced with the dual challenge of a healthy environment for employees and patrons, and a quality environment for the protection of valuable, irreplaceable collections.

Knowing how to provide a proper environment means understanding what problems and potential pollution sources you are up against. One must not only watch for internally generated pollutant sources, including the patrons, but must be careful of external pollutant sources. These internal pollutants include biofluents, volatile organic compounds and formaldehyde contaminants from building materials and furnishings. In new construction, the levels of contaminants generated from new furnishing or construction materials often are at elevated levels and care must be taken to keep them at a minimal level. Often times to control internal pollutants, more outside air is introduced to the space. While this might be an acceptable control measure for some buildings, for your museum it could introduce more potentially harmful contaminants that will ultimately damage your collections. In urban areas, outdoor peak levels of ozone, sulfur dioxide, nitrogen dioxide, and hydrocarbons are often 40% to 100% above allowable limits. These contaminants are often responsible for the slow degradation of valuable artifacts.

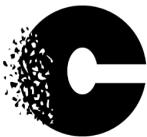
A Guide to Museum Air Quality

The Solution

To ensure that the indoor environment in museums is acceptable for both occupants and collections, molecular filtration is your best option. When selecting a molecular filtration system there are numerous options available in both types of adsorbent/chemisorbent media along with the hardware that holds the media. The best selection for your particular application will depend upon a variety of factors.

When looking into a molecular filtration system, items to be taken into consideration include physical space, ease of maintenance, types of contaminants present and concentration, temperature and humidity and the amount of air to be treated. You generally have two choices of media, a standard activated carbon or a blend of carbon and potassium permanganate. The standard activated carbon system will remove ozone, nitrogen dioxide and your higher molecular weight volatile organic compounds. These systems have been successfully used over the years and give you the benefit of regeneration. However, in instances where higher levels of formaldehyde and sulfur dioxide are suspected, your choice would be the blend of carbon and potassium permanganate. The potassium permanganate product readily reacts with the formaldehyde, sulfur dioxide, and other lower molecular weight contaminants to remove them from the air stream giving you added measure of protection. The ideal option is one pass of carbon and a pass of permanganate, this allows full use of both media beds, and eliminates changing a filter when only one media may be spent.

Your molecular filtration specialist at Cameron Great Lakes can assist you in the proper selection of both hardware and media that will be most efficient both in performance and economics.



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

NOTES ON THE PAPER AND PULP INDUSTRY

The pulp and paper industry is a major user of gas phase filtration media. The driving force is the failure of electronic process control equipment and motor control centers due to corrosion.

The corrosion occurs on the electrical equipment, such as the contacts and electrical leads. It is caused by the presence of airborne contaminants. The most common of these contaminants are hydrogen sulfide, oxides of sulfur, chlorine, and oxides of nitrogen. Temperature and relative humidity also play a roll in the corrosiveness of the environment.

The Pulp and Paper Industry suggests that safe environments for electrical equipment are contaminant levels that range from 0 to 5 ppb total. This is somewhat dependent upon the temperature and relative humidity of the environment and the types of contaminants present. Uncontrolled environments may have levels that are 10 times greater than “safe levels”.

Contaminants can enter the space via a number of different means: diffusion through cracks, porous walls and ceilings, diffusion through open doors, contaminants that offgas from clothing of personnel entering the space, internally generated contaminants, and displacement during opening and closing of doors.

When designing a new room these should be taken into consideration. The room should be pressurized with air free from contaminants to 0.05 - 0.09 in. WG and have a capacity for about 4-6 air changes per hour. The room should be equipped with a vapor adsorption system to provide purified air at “safe levels” as listed above. Temperature and humidity control is also required in environments where the temperature is greater than 75° F and the RH is above 60%.

VAPOR ADSORPTION SYSTEM:

Selection of an adsorber system depends upon a number of parameters, including performance and service life. Performance is affected by a number of factors, including media selection and physical integrity of the system. The adsorber must be capable of providing a zero- bypass seal.

Service life is dependent upon the following: types and concentration of contaminants, flow rate, media amount, and bed configuration.

MEDIA SELECTION:

The media of choice is either our CGL/CI OR CGL/ZK6. The CGL/CI is an impregnated carbon that is specifically designed to remove the lighter molecular weight compounds in the air stream, while still maintaining activated carbon’s ability to adsorb the higher molecular weight contaminants. The CGL/ZK6 is a potassium permanganate impregnated zeolite. This product also has the ability to remove the lighter molecular weight compounds. The ZK6 media is often used in conjunction with standard activated carbon to provide an efficient media bed.

A combination of good room design and properly specified vapor adsorption system has been proven to be an effective means of corrosion control problems. The end user benefits from decreased down time, reduction in expensive electrical equipment replacement, and increased production.



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

DEALING WITH SMOKE

Although smoking is on the decline, one should not overlook those places where smoking is permissible and must still be filtered. For example, the number of cigar bars is on the rise, bingo halls, casinos, and bars still have the need to provide cleaner air for their patrons and their employees. There are different approaches to these applications but ultimately what is required is the same. Removal of smoke requires both high efficiency particulate filtration and molecular filtration. One without the other is not effective.

Our recommendation on particulate filtration is to use a filter with a minimum 65% ASHRAE Efficiency. Our preference is to have a filter with a 90% Efficiency ASHRAE Rating. Anything less will compromise the overall effectiveness of the system.

As far as a choice of molecular filtration media, the best choice is always blend of carbon and permanganate. The number and types of contaminants that are generated as so vast and varied that only a blend will be able to address the majority of them.

When deciding the best method to remove smoke, it is important to first look at layout of the room or building. Answering the following questions will help to determine the filtration approach:

Does the AHU servicing the smoking area service non smoking area as well?

How much room does the AHU have for additional filtration?

Can the blower handle additional pressure drop?

Is the smoking area itself well isolated from the non-smoking area?

Once you have these answers we can begin to look at filtration alternatives. There are basically 2 filtration options.

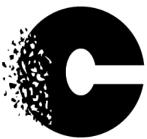


If the AHU services both smoking and non-smoking areas, then use of stand alone air cleaners in the smoking area may not completely resolve the odor problem in non smoking areas unless air cleaners are also placed in these areas. This is probably a more expensive alternative to providing filtration in the AHU itself which will insure that the supply air to the non-smoking area has been cleaned. Deciding filter type can also depend upon the size of the unit. In larger units you may wish to use refillable carbon panels. While up front costs are more expensive than disposable filters, future cost of service easily justifies the up front expense. Smaller units or those without much room can be well serviced with a filter such as the Vapor Trap disposable V-Bank which can be made in depths from 4" to 12" so room constraints become less of an issue.

If the AHU services only the smoking area than either option is acceptable. The use of stand alone air cleaners, such as the Cascade®, has proven very successful. It allows one to capture the contaminants closer to the source. The units can provide both the particulate filtration and molecular filtration required for removal of the harmful contaminants associated with smoke. A variety of unit sizes and mounting options makes them ideal in these applications.

As far as a choice of molecular filtration media, the best choice is always blend of carbon and permanganate. The number and types of contaminants that are generated as so vast and varied that only a blend will be able to address these contaminants.

For more information on the above products please contact us at: sales@cglcarbon.com or visit our website, www.camerongreatlakes.com.



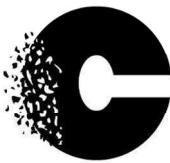
CAMERON GREAT LAKES, INC.

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MEDIA SELECTION GUIDE BY APPLICATION

| APPLICATION ↓ | MEDIA → | MR, CP, CCR, CCS | ZK6 | CI | AC/ZK6 | PA |
|------------------------------------|---------|---------------------|-----|----|--------|----|
| AIRPORTS | X | | | | X | |
| HOSPITALS | X | | | | X | |
| MORGUES | | | X | | | |
| NAIL SALONS | X | | | | | |
| WASTEWATER TREATMENT FACILITIES | | | | X | | |
| PULP & PAPER MILLS | | | | X | | |
| HAIR SALONS | X | | | | | X |
| MUSEUMS | | | | | X | |
| RESTAURANTS/ COOKING ODORS | X | | | | X | |
| CLEANING COMPOUNDS | X | | | | | |
| PRISONS | X | | | | | X |
| OFFICE BUILDINGS | X | | | | X | |
| PET ODORS | | | | | | X |
| TOBACCO ODORS | | | | | X | |

The above information is to be used as a general guideline. It is based upon contaminants normally found in these applications. Some individual applications may have unique contaminants introduced that would require a different media selection to adequately provide removal. If you feel that is the case, please contact CGL for additional technical assistance. Filter selection is dependant upon individual application requirements, including space available and pressure drop.



Benefits of a Carbon/Permanganate Blend

WHY A BLEND?

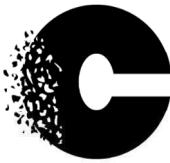
For odor control/molecular filtration applications, end users are often faced with the question of which filter media will perform best for the application. Unfortunately, there are many applications where we are unable to identify all of the existing contaminants in the airstream....or, we are faced with a myriad of known contaminants which require more than one type of media to remove or destroy the contaminants.

Standard activated carbon is recommended for the removal of the heavier volatile organics, while potassium permanganate is recommended for the removal of low molecular weight contaminants. A blend of these two media, offers the end user a product that is capable of addressing the vast majority of contaminants without expensive testing to identify individual contaminants.

In some applications such as diesel fume odors, kitchen cooking odors, and smoke odors, we are not aware of all contaminants present and generally recommend the use of a carbon & potassium permanganate media blend which is the best possible solution to odors where all contaminants may not be identified. Additionally this blend when used in refillable filters can be classified as UL Class 1.

It is safe to say that using a blend of media in commercial IAQ applications is a smart and safe choice.

See CGL C/ZK6 Specification sheet for technical information on potassium permanganate/activated carbon blended media.



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Vapor Trap -DF Dusting Filter

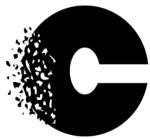
- **Negates downstream dust**
- **Lower pressure drop than bonded panels**
- **Performance uncompromised by binders**

Don't compromise performance for fear of generating dust. The Vapor Trap DF filter allows the end user to have the best of both worlds; a bulk fill carbon filter whose efficiency is not comprised by adhesives, long life with high carbon weight, and a dusting filter that prevents small particulate matter from traveling downstream of the filter.

The Vapor trap DF is ideal for the semiconductor industry and any other applications where dusting is a concern.

Dusting with bulk carbon filters most often occurs upon initial start up. Transportation of the filters causes dusting which upon installation in the airstream may travel downstream a short distance. If dusting is an issue upon receipt of the filter shake out any loose material caused from transport and then install into the airstream. The downstream dusting filter will then provide the added protection for the life of the filter.

This information has been gathered from standard reference materials and/or test procedures and is believed to be true and accurate. It is offered solely for your consideration and verification. None of the information presented shall be construed as constituting a warranty or representation, expressed, written, or implied. For which we assume legal responsibility or that the information or goods described is fit for any particular use either alone or in combination with other goods or processes. Or that its uses does not conflict with existing, patent rights. No license is granted to infringe on any patent rights or practice any patent inversion.



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MOLECULAR FILTRATION SPECIALISTS

DESIGN QUESTIONNAIRE

In order to provide you the best possible system for your application, please answer as many questions below as possible and we will provide you with a quote on the housing or filter we feel is best suited for your needs.

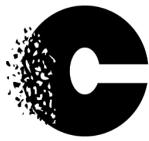
| | | | |
|--------------------------------------------------------------|------------|------------|------------|
| Give us a brief description of the application. | | | |
| Air Volume being treated in CFM | | | |
| Space Available (housings) | Height, in | Width, in. | Depth, in. |
| Temperature, F | | | |
| Contaminants present and levels if known/ application | | | |
| Desired first pass removal efficiency | | | |
| Location, indoors or out of doors | | | |

Page 1 of 2



DESIGN QUESTIONNAIRE

| | |
|----------------------------------------------|--|
| Maximum Allowable Pressure drop | |
| Refillable or Disposable | |
| Downstream Dusting Filter required | |
| Filter or housing Weight restrictions | |
| Filter Size restrictions | |
| Other pertinent data or requirements | |



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CONTAMINANT OVERVIEW FOR VEHICLE EXHAUST

Table one will review the contaminant classes found in automobile exhaust and diesel exhaust. It is important to note that those with the highest concentration levels below may not necessarily be the cause of IAQ complaints and/or health concerns.

TABLE 1

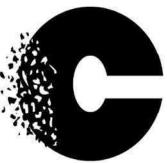
| Contaminant | Automobile | Diesel Engines |
|--------------------|------------------------------------|----------------|
| | In pounds per 1000 gallons of fuel | |
| Aldehydes | 4 | 10 |
| Carbon Monoxide | 2300 | 60 |
| Hydrocarbons | 200 | 136 |
| Oxides of Nitrogen | 113 | 222 |
| Oxides of Sulfur | 9 | 40 |
| Organic Acids | 4 | 31 |
| Particulates | 12 | 110 |

Table two will review the threshold Limit Value and the Odor Threshold for the specific compounds below. The TLV below is the level at which health concerns may be expected. However even when the contaminants are present below the TLV it is possible that the source of an IAQ complaint may be contaminant present in concentrations meeting or exceeding its odor threshold.

TABLE 2

| Contaminant Class | Compound | TLV, PPM | Odor Threshold, PPM |
|--------------------|------------------|----------|---------------------|
| Aldehydes | Formaldehyde | 1.0 | 1.0 |
| | Acrolein | .01 | 0.2-15 |
| Carbon Monoxide | Carbon Monoxide | 50 | n.a. |
| | Toluene | 200 | 2.14-15 |
| | Cyclohexane | 300 | 0.41 |
| Hydrocarbons | Xylene | 100 | 0.47-200 |
| | Nitrogen Dioxide | 5.0 | 5.0 |
| | Nitric Oxide | 25.0 | 0.3-1.0 |
| Oxides of Nitrogen | Sulfur Dioxide | 5.0 | 0.47-5.0 |
| Oxides of Sulfur | Acetic Acid | 10.0 | 0.2-2.4 |
| | Hydrogen Sulfide | 20.0 | 0.00047-4.6 |
| Organic Acids | Ozone | .01 | 0.1 |
| | | | |

Several hundred compounds have been detected from vehicular exhaust. These are just a few of the major known components.



CAMERON GREAT LAKES, INC.
MOLECULAR FILTRATION SPECIALISTS

CAMERON BREAKTHROUGH INDICATOR

for Vapor Phase Applications

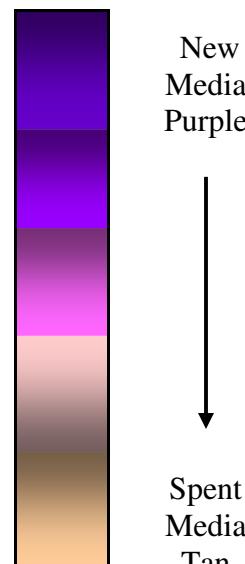
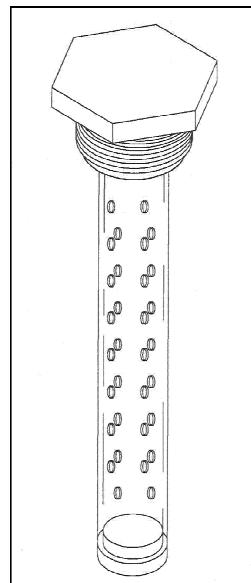
CBI

Cameron Breakthrough Indicators (CBI's) are an affordable means to monitor contaminant breakthrough to determine when the saturated media needs to be replaced. The durable, clear acrylic site gauge contains our CGLZK6 potassium permanganate impregnated media.

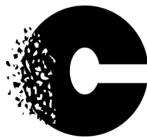
Based upon the history of the waste stream, check the CBI as required. When the filtration media can no longer adsorb the VOC's, the potassium permanganate media changes color from purple to brown and when totally spent it is a very light tan to off white. The CBI helps avoid early media or vessel replacement and helps keep your pollution control equipment operating at peak efficiency.

TO INSTALL THE INDICATOR:

1. Remove the indicator from its protective packaging.
2. Remove the 3/4" threaded plug from the drum lid or vessel. If the indicator is to be installed in ductwork, cut an appropriately sized hole. Thread the indicator into the opening, or alternatively hang downstream of the filters.
3. Note date of installation and schedule periodic inspections.
4. When the indicator media changes from purple to tan, call **CAMERON GREAT LAKES, INC.** or your local representative for filtration media changeout.



The chart above shows the progression of color change that can be expected with ZK6.

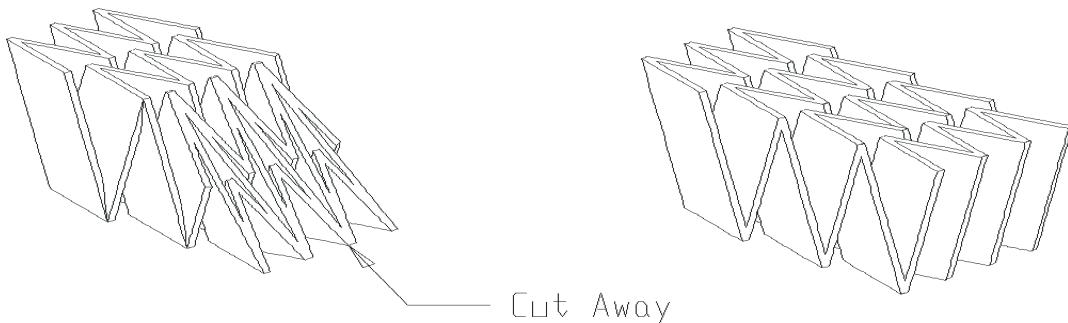


CAMERON GREAT LAKES, INC.
MOLECULAR FILTRATION SPECIALISTS

CHEVRON PLEAT PARTICULATE FILTERS

Chevron filters, manufactured by Cameron Great Lakes, Inc., feature the unique "Rhombus Pleat". The Rhombus pleat achieves structure and spacing from a two-way folded geometric pattern. This pleating method requires no separators which can take up available space and potentially damage high efficiency media, additionally it provides extensive surface area allowing for low pressure drop and high efficiency. The folding process creates wedge shaped voids which allow larger particulate matter to accumulate at the bottom of the void, this helps prevent bridging thus extending the life of the filter.

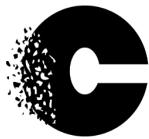
Pleated Paper



PRODUCT SPECIFICATIONS

The Chevron filters are available in 3 efficiencies, 93% DOP, 90% ASHRAE and 60% ASHRAE. The standard thicknesses offered are 1 1/2", 1 7/8", 2 7/8", 3 7/8" and 5 7/8". The frame material is either heavy aluminum or galvanized metal. All filters are hot glued in the frame to prevent bypass. Gasket, downstream reinforcing wire cloth, and specialty labeling are available upon request.

Chevron pleated filters are ideal for use in equipment such as, medical vacuum devices, portable air cleaners, welding and fume extractors, and other specialty equipment where custom filter sizes are required. The filters can also be combined with our activated carbon disposable filters to provide both odor and particulate filtration in one single product.



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

CREDIT APPLICATION

BUSINESS NAME: _____

CONTACT: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

PHONE: _____ FAX: _____

TRADE REFERENCES

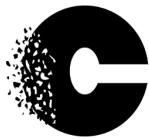
| |
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| Company |
| Address |
| Phone / Fax |
| Company |
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| Phone / Fax |
| Company |
| Address |
| Phone / Fax |
| Company |
| Address |
| Phone / Fax |

BANK REFERENCE

| |
|----------------|
| Name / Address |
| Account Number |
| Contact Name |
| Phone / Fax |

I certify that all the information on this form is correct. I fully understand your credit terms and I guarantee full and proper payment for all invoices and merchandise in consideration of extended credit.

Signature/Title _____ Date: _____



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

BANKING REFERENCES

AUTHORIZATION TO RELEASE INFORMATION

I authorize _____ Bank to release any information necessary to assist in establishing a line of credit with Cameron Great Lakes, Inc..

FIRM NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP CODE _____

AUTHORIZED BY:

SIGNATURE

PRINT NAME

TITILE

DATE: _____