

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.

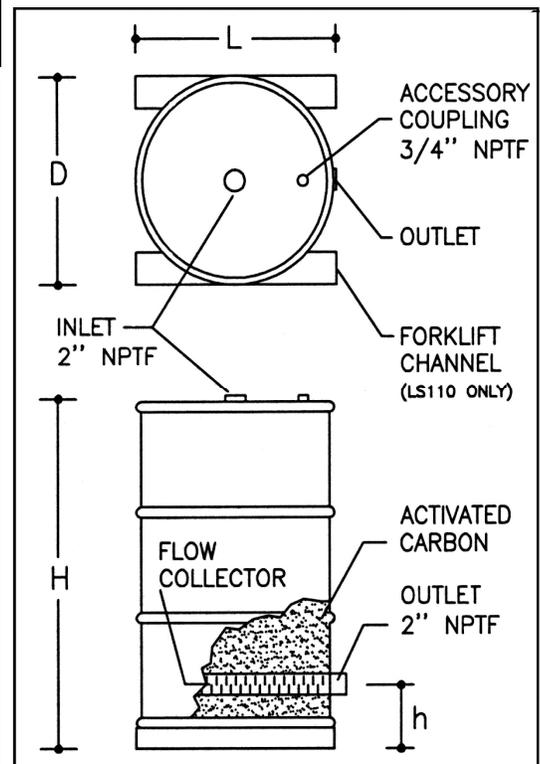
CGL Liqui Scrub units are constructed of heavy-duty mild steel and are lined with doubled layered epoxy coatings. Forklift channels are provided on the LS 110 model only. Adsorber internals consist of a PVC underdrain designed for even flow distribution and complete carbon bed use. Downflow operation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

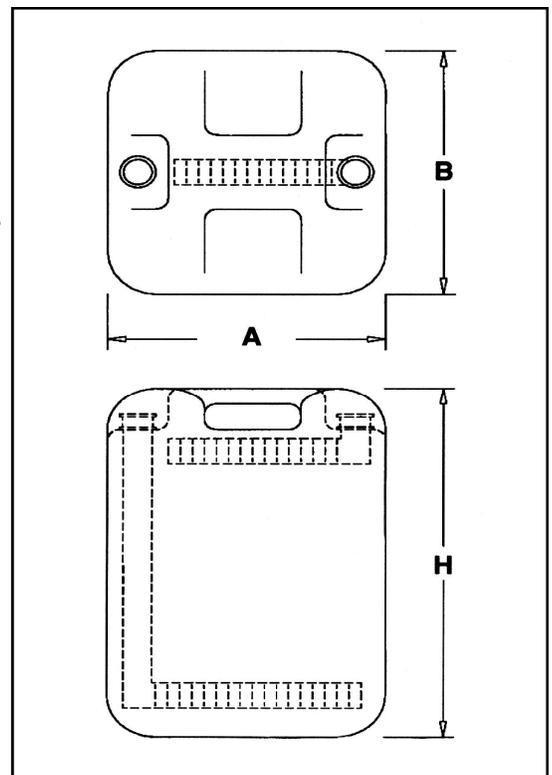
SPECIFICATIONS

LS	150 PC
INLET/OUTLET(in.)*	2" / 2"
H - Height (in.)	29
A - Width (in.)	19
B - Width (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.



CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

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

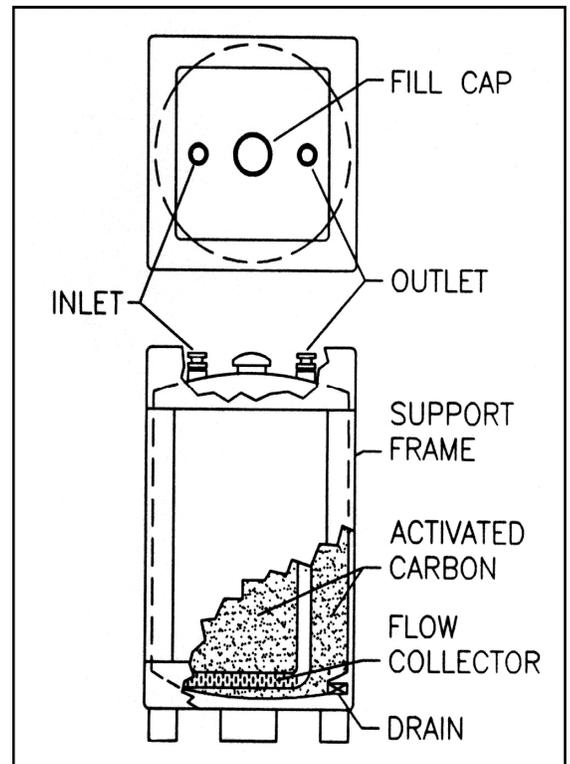
The Cameron Great Lakes Liqui Scrub unit model LS1000P is filled with high quality activated carbon, and is designed for effective purification of your liquid waste or process stream. The LS1000P has a proven ability to remove organic contaminants to non-detectable levels.

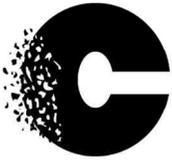
The LS1000P features a *pressure rated* (15 or 30 psig) polyethylene (PE) cylindrical tank encased in a very strong 1/2" thick PE frame on a square base with 4-way forklift access. Adsorber internals consist of a PVC underdrain designed for even flow distribution and complete carbon bed use. Downflow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





CAMERON GREAT LAKES, INC.

MOLECULAR FILTRATION SPECIALISTS

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.

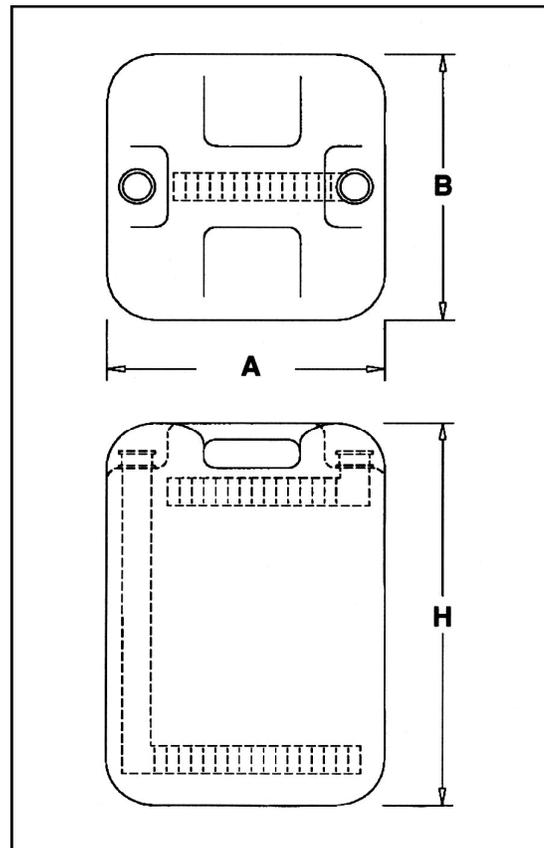
- No metal parts for easy thermal destruction
- Meets DOT-34 and UN Hazardous requirements
- Vessel construction meets FDA requirements for direct food contact
- Easy field installation
- Completely corrosion resistant
- Maintains structural integrity at low temperatures

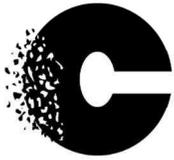
SPECIFICATIONS

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 - Width (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.

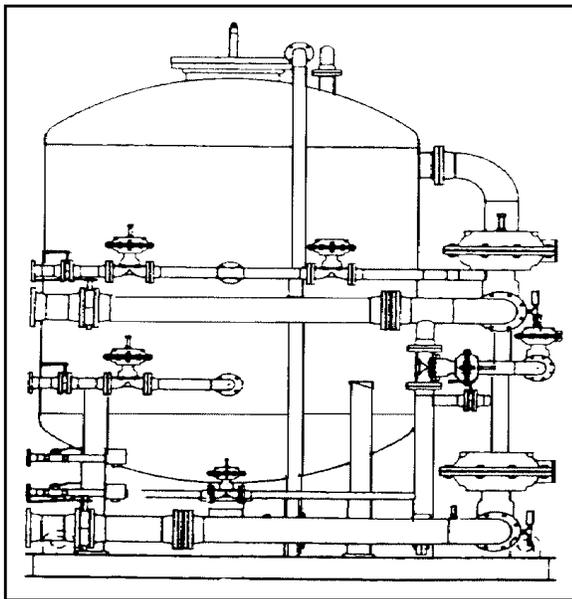
DISTRIBUTOR SYSTEM

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

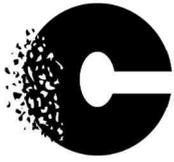
- A. Flanged or threaded connections.
- B. Linings: Rubber, epoxy, galvanizing, fiberglass.
- C. Number, size, and location of manways, handholes, fittings;
- D. Valves, automatic air vents, face piping, controls.
- E. Vessel pressure ratings and certifications: ASME, National Board, Military, AWWA
-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

PAGE 1 OF 2

2335 NW 29TH AVENUE, PORTLAND, OR 97210
PHONE: (800) 777-4044 FAX: (503) 225-0137

WWW.CAMERONGREATLAKES.COM
EMAIL: SALES@CGLCARBON.COM



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"

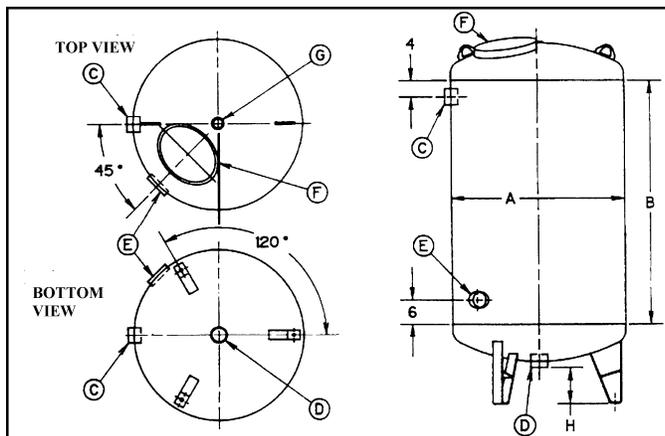


DIAGRAM CODES

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

Page 2 of 2



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 recommend. 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.