

## CYCLESORB® FP2

### Description

Calgon Carbon Corporation's CYCLESORB® FP2 is a compact, portable liquid treatment unit with all of the essential elements of a full scale carbon adsorption system. Containing 2,000 pounds of granular activated carbon, the CYCLESORB® FP2 can treat up to 60 gpm for the removal of dissolved organic contaminants. When treatment is complete, the CYCLESORB® FP2 becomes a convenient shipping container which can be returned to Calgon Carbon for safe reactivation of the spent carbon.

The CYCLESORB® FP2 is ideal for many low flow or short duration treatment projects including:

- Groundwater contaminated by leaking underground storage tanks
- Wastewater storage in tanks or lagoons
- Chemical spills
- Small wastewater or process streams
- Storage tank or pipeline washing
- Off-spec product batches
- Dechlorination or decolorization
- Pump tests
- Feasibility or pilot plant studies
- Acid Purification



### Features

#### *Flexibility*

The CYCLESORB® FP2 treats the liquid downflow through a fixed bed of granular activated carbon and, therefore, can handle varying flows and on/off operating conditions. The units can be arranged in parallel to treat higher flows or can be connected in series to optimize carbon usage.

#### *Recommended Design*

The CYCLESORB® FP2 has flexible connections to the FRP vessel to eliminate the potential for piping stress on the vessel and a metal frame to protect the FRP vessel from damage during shipping and handling.

#### *Corrosion Resistance*

The CYCLESORB® FP2 adsorber is made from fiberglass-wrapped polyethylene. The piping and other accessories are made from industrial plastics able to handle a wide range of corrosive wastewaters or liquids.

#### *Higher Operating Pressures*

The CYCLESORB® FP2 adsorber vessel is rated to 150 psig in accordance with NSF-44 Standards. The pre-piped assembly has a maximum operating pressure of 75 psig at 140°F.

#### *Granular Activated Carbon*

The CYCLESORB® FP2 can be provided with 2,000 pounds of selected grades of liquid phase granular activated carbons including both virgin or reactivated grades. A Technical Sales Representative can assist in selecting the most cost-effective carbon for specific applications.

#### *Sales Spent Carbon Handling*

When treatment is complete, the CYCLESORB® FP2 becomes the shipping container for the return of the spent carbon to a Calgon Carbon Corporation reactivation facility. This feature eliminates the need to handle spent carbon at the site. When returned to Calgon Carbon Corporation, the spent carbon is safely reactivated and all the adsorbed contaminants are thermally destroyed.

#### *Service or Purchase Options*

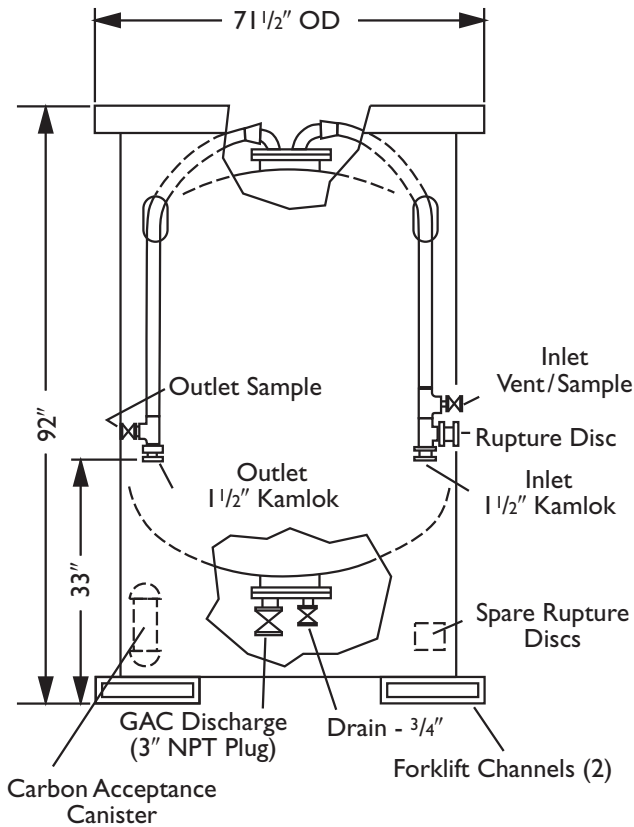
The CYCLESORB® FP2 is available on a service or purchase basis. With the service option, Calgon Carbon Corporation retains ownership of the unit, takes responsibility for inventory and maintenance, and provides a new unit when the exhausted carbon is to be removed so that continuous treatment is assured. If the CYCLESORB® FP2 is purchased, Calgon Carbon Corporation can provide refill and maintenance service.

### Equipment and Systems

Visit our website at [www.calgoncarbon.com](http://www.calgoncarbon.com), or call 800-422-7266 to learn more about our complete range of products and services, and obtain local contact information.

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## Specifications

### Piping and Accessories

The CYCLESORB® FP2 piping consists of Schedule 80 polypropylene piping and viton hose. Piping is threaded, and hoses have polypropylene kamlok Connections. GAC Discharge is equipped with a polypropylene ball valve, a threaded union connection, and a 3 inch threaded (plugged) outlet. Connections at the system are polypropylene connections as follows:

Influent	1 1/2 inch Kamlok
Effluent	1 1/2 inch Kamlok
GAC Discharge	3 inch NPT

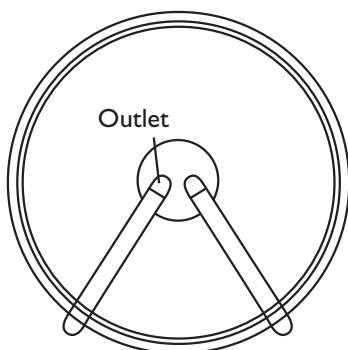
The influent and effluent lines are equipped with 1/2 inch ball valves for sample and/or vent. The adsorber is equipped with a 75 psig graphite rupture disk: on the influent line. Gaskets, as required, are EPDM rubber.

### Wetted Parts Summary - Process Flow

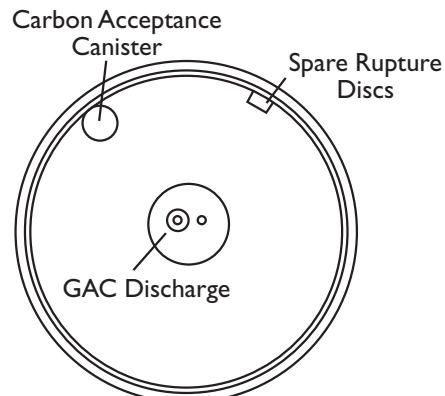
Wetted parts are polyethylene, polypropylene, viton (hose), EPDM rubber (gaskets), PVC (sample valves/drain valve), and graphite (rupture disk).

### Frame

The CYCLESORB® FP2 frame is designed to contain and protect the adsorber and piping during operation and transport. The frame is constructed of metal and is 69"x69"x92" high. The frame is equipped with fork channels and may be moved via forklift or lifted using 2 eyelets at the top of the frame.



Top Plan



Bottom Plan

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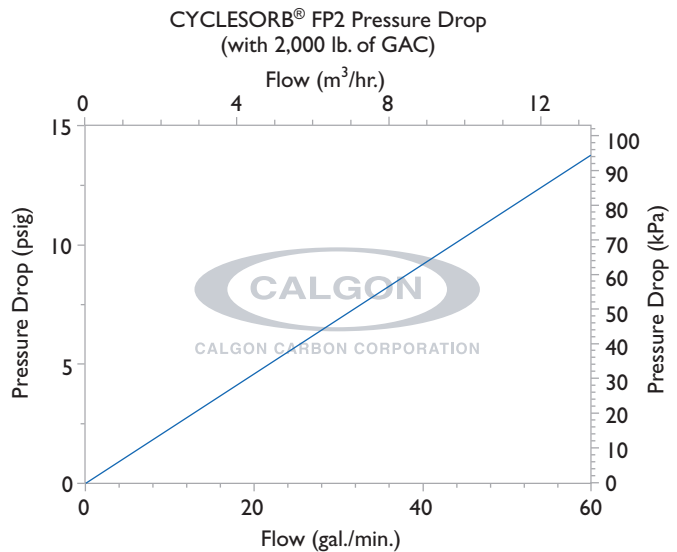
Granular activated carbon per unit	2,000 lb. (908 kg)
Maximum operating carbon pressure	75 psig (517 kPa) @ 140°F
Pressure relief	Graphite rupture disk @ 75 psig
Vacuum rating	Must be protected against vacuum
Temperature rating	140°F (60°C)
Wetted parts materials	High density polyethylene polypropylene, PVC, graphite, viton, ethylene propylene rubber
Connections	1 1/2" Kamlok (inlet/outlet) 1/2" FNPT (sample/vent/drain) 3" FNPT (carbon discharge)
Frame	Epoxy mastic painted metal
Strap Materials	Polyester
Frame dimensions	69" x 69" x 92" height (1,750mm x 1,750mm x 2,337mm height)
Lifting	Fork lift truck or crane (2 eyelets provided)
Weights	Empty: 1,750 lb. (796 kg) With dry carbon (ship): 3,750 lb. (1,700 kg) With wet, drained carbon (return): 5,750 lb. (2,610 kg) Operating: 8,100 lb. (3,675 kg)

## Performance

Pressure drop performance is based upon "general" granular activated carbon in mesh size ranges from 8x30 to 12x40.

<u>Approx. Flow (gpm)</u>	<u>Approx. Pressure Drop (psig)</u>
20	4.5
40	9.1
60	14.0

Note: Above performance based upon average GAC packed bed and clean water; actual conditions may vary.



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## Return for Reactivation

The CYCLESORB® FP2 unit serves as a safe and convenient shipping container to return the spent carbon to Calgon Carbon Corporation for reactivation. Spent carbon reactivation is an integral component of the Service Agreement where the Company provides a unit with fresh carbon to replace the unit being returned. If the unit is purchased, Calgon Carbon Corporation is able to offer exchange services incorporating most of the return and refill elements of the CYCLESORB® Service.

Prior to reactivation, an acceptability test is conducted on a small carbon sample provided with the initial CYCLESORB® FP2 adsorber, which is exposed to the water or wastewater to simulate spent carbon characteristics. After this test is complete, carbon acceptance documentation is provided to allow return of the initial and subsequent CYCLESORB® FP2 units used in the same service.

When treatment is complete, the CYCLESORB® FP2 adsorber is drained of liquid, capped, and shipped back to a Calgon Carbon Corporation reactivation facility. The Company's Flexible Service Plan also offers services such as transportation assistance and on-site exchange services. A Technical Sales Representative will be able to review the many options available for purchase, service, return, and carbon exchange.

At the reactivation facility, the spent carbon is thermally reactivated and the adsorbed organic contaminants are destroyed. The CYCLESORB® FP2 units are cleaned, inspected, maintained, and returned to inventory. CYCLESORB® FP2 units are then taken from ready inventory, filled with the specified carbon, and provided to the next service customer for replacement or start of treatment.

## Precautionary Statement

Do not strike vessel or subject it to impact, as such practices will damage the structural integrity of the unit. Bolted connections should be inspected prior to operating the system as they may loosen during shipping.

The rupture disk must not be plugged or restricted, as the system must be able to relieve over pressurization to prevent component failure or vessel rupture. The installation must include vacuum relief, as vacuum created by a siphon loop or other means will cause collapse of the internal vessel wall and leakage.

The system includes flexible connections on the inlet and outlet. These flexible connectors should not be replaced by rigid piping, as expansion of the vessel under pressure could cause damage to the piping or the vessel.

## Safety Message

Wet activated carbon preferentially removes oxygen from air. In closed or partially closed containers and vessels, oxygen depletion may reach hazardous levels. If workers are to enter a vessel containing carbon, appropriate sampling and work procedures for potentially low oxygen spaces should be followed, including all applicable Federal and State requirements.

## Limitations of Liability

The Supplier's liability and the Purchaser's exclusive remedy for any cause of action arising out of this transaction, including, but not limited to, breach of warranty, negligence and/or indemnification, is expressly limited to a maximum of the purchase price of spare parts or equipment sold hereunder. All claims of whatsoever nature shall be deemed waived unless made in writing within forty-five (45) days of the occurrence giving rise to the claim. In no event shall the Supplier, for any reason or pursuant to any provision of the warranty, be liable for incidental or consequential damages or damages in excess of the purchase price, nor shall the Supplier be liable for loss of profits or fines imposed by governmental agencies.

Visit our website at [www.calgoncarbon.com](http://www.calgoncarbon.com)



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