

# CYCLESORB® FP SERIES ADSORBERS

## Installation and Operation Instructions



### Description

Calgon Carbon's CYCLESORB FP series adsorbers are individual, compact, transportable liquid phase adsorbers. CYCLESORB FP adsorbers were developed for convenient installation and operation. CYCLESORB FP adsorbers can be returned to Calgon Carbon for reactivation of the spent granular activated carbon (GAC) and refilled with fresh GAC. Calgon Carbon offers many types of GAC, which can be selected for the specific treatment application. CYCLESORB FP adsorbers are fiberglass pressure vessels with a polyethylene liner with piping and accessories of industrial thermoplastics for corrosion resistance. The CYCLESORB FP adsorbers are available in the following standard units:

- CYCLESORB® FP1: 1,000 lbs. GAC, 30 gpm flow capacity
- CYCLESORB® FP2: 2,000 lbs. GAC, 60 gpm flow capacity

The specific CYCLESORB FP product bulletin is considered to be part of these instructions and should be referred to when necessary

### Shipment

CYCLESORB FP adsorbers are shipped as a single adsorber with an integral frame without crating or containers. The CYCLESORB FP adsorbers are provided with fork channels for moving with fork trucks or can be lifted and moved with a crane. The CYCLESORB FP adsorbers are shipped filled with the specified amount of dry GAC. Shipping weights are as follows:

- CYCLESORB FP1: 1,560 lbs.
- CYCLESORB FP2: 3,750 lbs.

### Wetting and Deaeration

As the CYCLESORB FP is shipped with dry GAC, the carbon must be wetted and deaerated prior to use. This procedure displaces air from the internal structure of the carbon granule, thus assuring that the liquid to be treated is in contact with the carbon surface. Prior to operation, the adsorber must be filled with clean, uncontaminated liquid. With the vent valve open, the liquid is introduced through the outlet line, and the unit is filled until the liquid flows out the vent. The CYCLESORB FP should be allowed to set for a minimum of 24 hours (preferably for 72 hours) to allow most of the carbon internal surface to be wetted. The wetting curve indicates how much of the internal surface becomes wetted over time.

After wetting, the carbon bed can be deaerated by draining the adsorber and again filling the adsorber upflow with uncontaminated water. This procedure will eliminate any air pockets which may have formed between the carbon granules. The CYCLESORB FP is now ready for operation.

### Installation

The CYCLESORB FP should be set on a flat surface, capable of supporting the operating weight of the CYCLESORB FP unit. Operating weight of the units are as follows:

- CYCLESORB FP1: 4,000 lbs.
- CYCLESORB FP2: 8,100 lbs.

The inlet and outlet piping should be connected to the unit using flexible hoses with 1 1/2 inch Kamlok type female hose connections. The outlet piping should be designed to allow flooded operation of the CYCLESORB FP at all times to assure effective operation. If the outlet line does not provide for backpressure on the CYCLESORB FP unit, then the discharge piping should include an elevated piping loop to assure flooded operation.

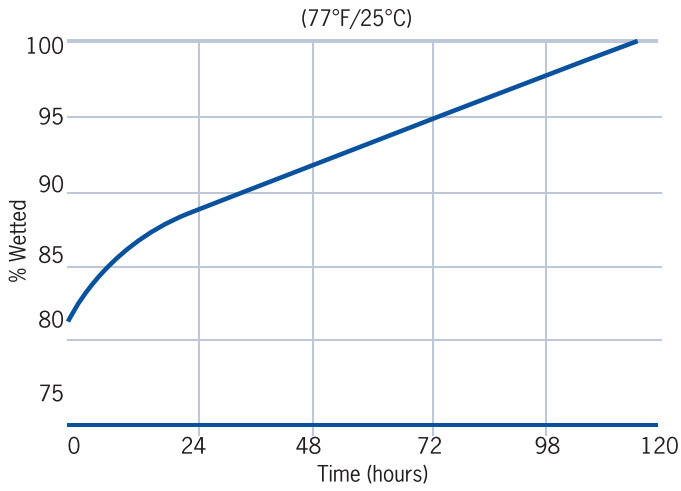
CYCLESORB FP adsorbers can be manifolded in parallel operation for higher flow rates. For series operation, two CYCLESORB FP adsorbers can be connected sequentially, as normal pressure drop will not exceed recommended operating pressure.

A filter should be installed prior to the CYCLESORB FP if the fluid to be treated contains substantial amounts of suspended solids. A simple cartridge or screen filter helps prevent pressure buildup in the GAC bed.

### Safety Message

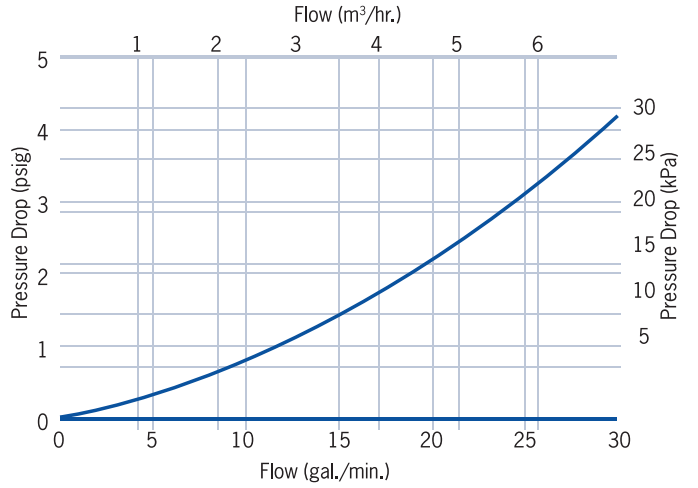
Wet activated carbon can deplete oxygen from air in enclosed spaces. If use in an enclosed space is required, procedures for work in an oxygen deficient environment should be followed.

### Wetting Curve for GAC

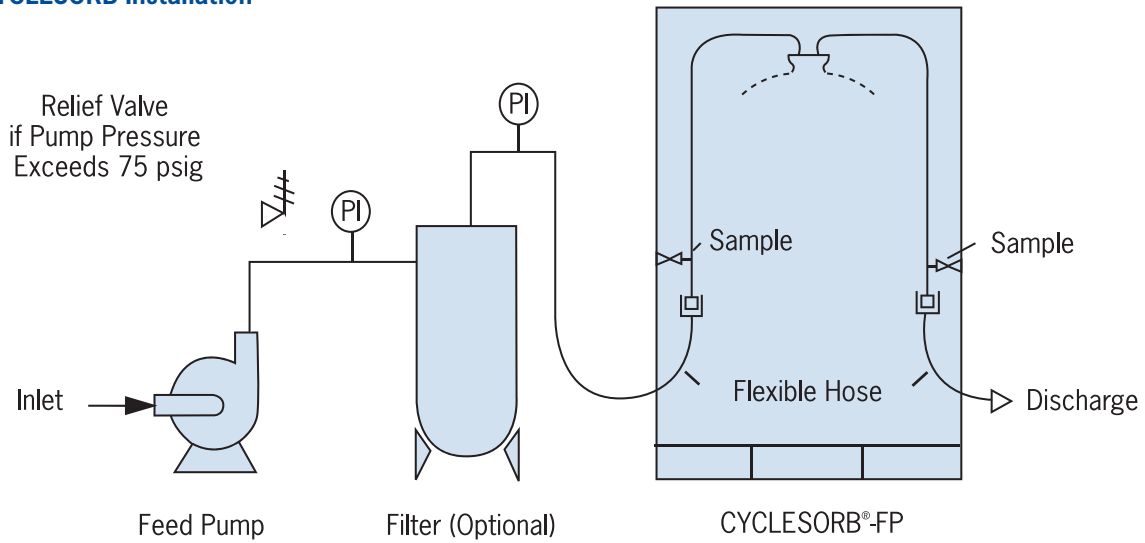


### Pressure Drop Curve

with 1,000lb. of GAC



### Typical CYCLESORB Installation



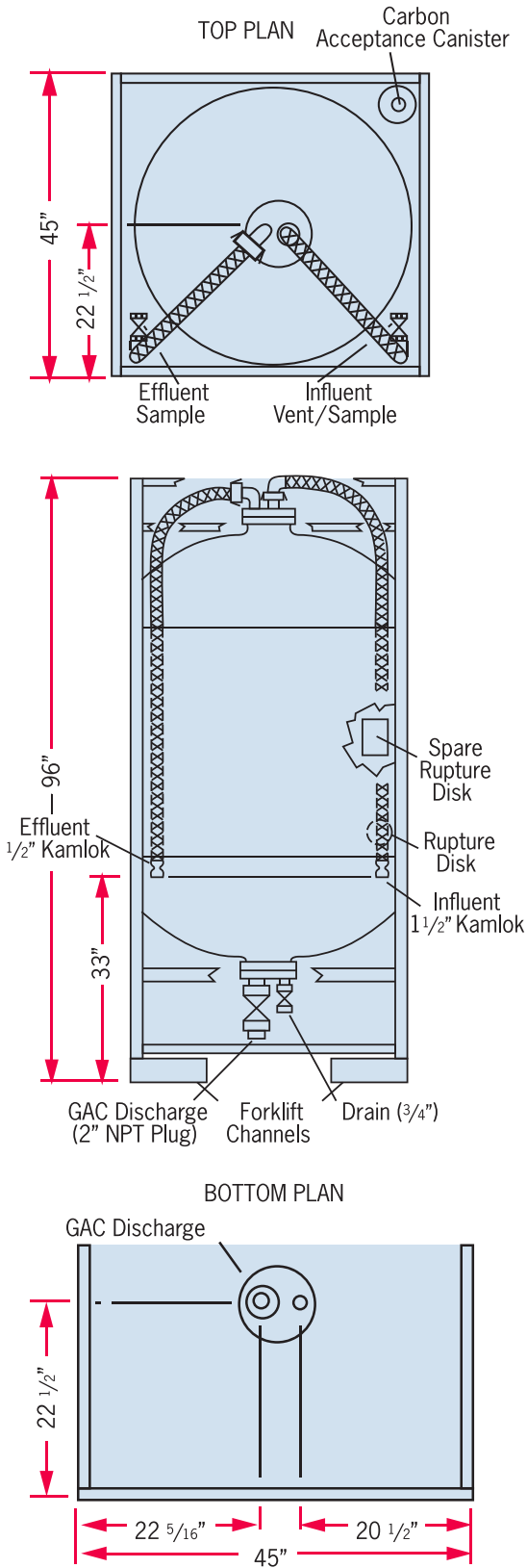
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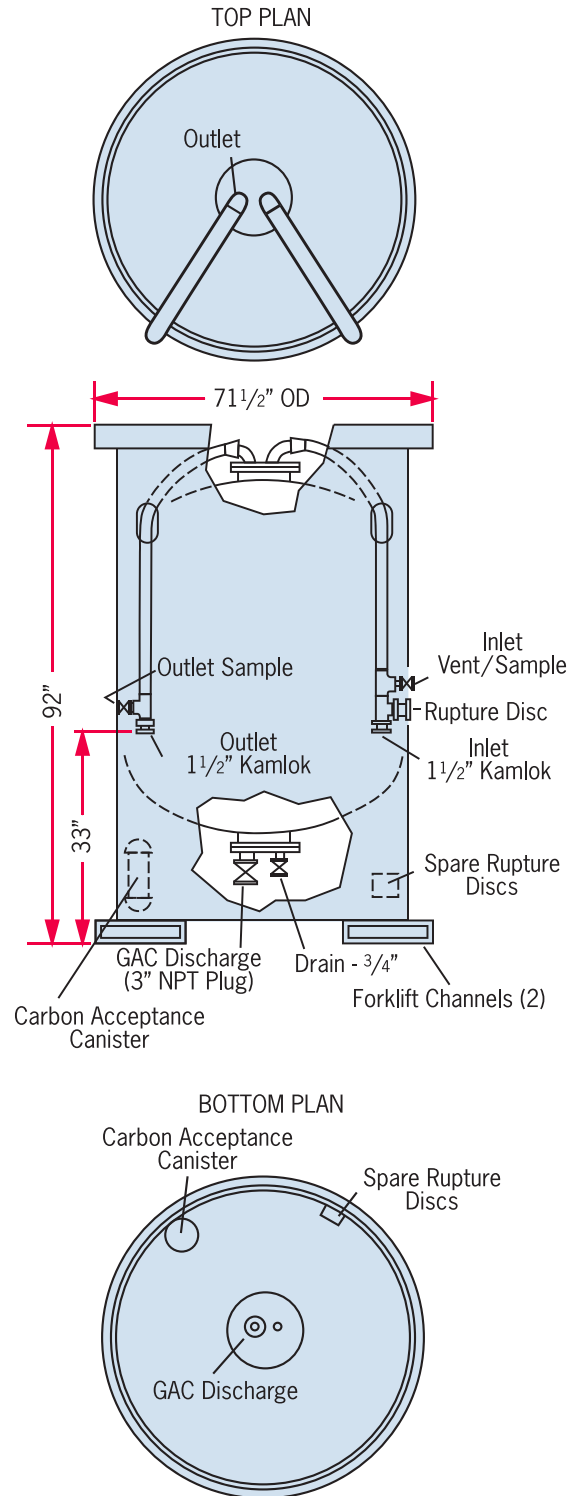
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DS-CYCLESORBFP15-EIN-E1

**CYCLESORB FP1**



**CYCLESORB FP2**



**Safety Message**

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## Operation

With the CYCLESORB FP full of liquid, flow can be introduced to the unit. Liquid enters the inlet connection, flows downflow through the carbon bed and exits through the outlet connection.

Flow rates to the CYCLESORB FP should be determined based on the required contact time between the liquid and the carbon media. The required contact time is normally determined prior to installation and operation of the CYCLESORB FP.

If suspended solids accumulate on the top of the GAC bed, the CYCLESORB FP can be backflushed to remove solids and resume operation. Clean, uncontaminated liquid should be introduced to the unit through the outlet connection. This liquid flows upflow through the unit and should exit through the vent line that is directed to a backflush water collection point or drain. The flow rate should not be high enough to cause carbon granules to exit. Typical backflush rate is 5gpm/ft<sup>2</sup>.

CYCLESORB FP absorbers are provided with rupture disks to assure that the operating pressure is not exceeded. If the rupture disks burst, do not continue to operate by blinding the rupture disc line. Investigate the cause of the high pressure and remedy. Spare rupture disks are provided in the spare rupture disk holder on the unit. Replace the rupture disks before continuing operation and contact Calgon Carbon for replacement of spare disks.

For short term shutdowns, simply isolate the CYCLESORB FP unit by shutting inlet and outlet lines and open the vent line. For extended shutdowns, also drain the CYCLESORB FP to interstitial liquid.

## CYCLESORB FP Return

No CYCLESORB FP adsorber can be returned to Calgon Carbon for refill service or spent carbon reactivation unless the carbon acceptance procedure has been completed and an acceptance number provided.

Prior to return shipment, the CYCLESORB FP is disconnected from the inlet and outlet lines, and all liquid is drained from the absorber using bottom drain connection. Do not open the GAC discharge valve to drain liquid from the unit. After draining, hose caps must be placed on all hose connectors. Calgon Carbon customer service should be notified when the CYCLESORB FP is ready to ship. The CYCLESORB FP shipment must be accompanied with the site name and the carbon acceptance number provided by Calgon Carbon.

## Spent Carbon Discharge

Prior to return of either the CYCLESORB FP or the spent GAC to Calgon Carbon, the spent GAC must undergo acceptance testing. The CYCLESORB FP adsorbers are provided with a carbon acceptance canister and instructions for carbon acceptance testing. Inlet liquid should be introduced to the carbon acceptance canister and allowed to flow for enough time to allow the carbon to adsorb sufficient amounts of contaminants for acceptance testing. The acceptance canister should then be drained, sealed, and shipped to Calgon Carbon in accordance with instructions to allow for testing.

## Monitoring

CYCLESORB FP units only require periodic monitoring if properly installed. The following items may need to be monitored:

1. Pressure: check inlet and outlet pressure (increase in pressure differential may indicate build-up of filtered solids)
2. Samples: inlet and outlet sample points are provided for liquid analysis to determine system performance
3. Air: check for trapped air by isolating the CYCLESORB FP (shut inlet and outlet) and opening the inlet sample top or vent

## Fresh Carbon Fill

Fresh carbon is filled using dry GAC. The CYCLESORB FP should be approximately one-third filled with clean liquid to provide for a cushion to protect the collection nozzle. The 2 inch inlet hose connection on the top flange is opened, and the GAC filled directly into the CYCLESORB FP (a funnel is recommended). When the fill is complete, the inlet hose is reconnected and the start-up procedure is followed including wetting and deaeration.

## Safety Message

CYCLESORB FP absorbers are FRP pressure vessels with a polyethylene liner; do not strike the outside of the vessel or expose the vessel to vacuum, either of which may damage the inner liner.

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