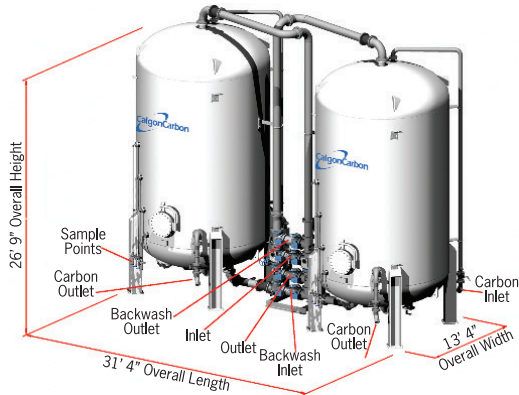


## MODEL 12-40

### Modular Carbon Adsorption System



#### Description

The Calgon Carbon MODEL 12-40 is an adsorption system designed for the removal of dissolved organic contaminants, including disinfection byproducts (DBP) or natural organic matter (NOM) from liquids using granular activated carbon (GAC). The vessels are sized to hold 40,000 pounds of GAC, which provides the additional contact time required to remove either compounds at low concentrations or poorly adsorbing compounds. The standard design (MODEL 12-40 SYSTEM) consists of two vessels combined with a centralized pipe manifold to allow for series operation. Many of the DBP installations utilize multiple vessels operated in parallel. For these cases, an optional offering is the single vessel concept (MODEL 12-40 SINGLE). This flexibility of configurations allows the engineer to select the alternative that best meets the requirements of the site and treatment objectives.

The MODEL 12-40 SYSTEM is delivered as two adsorbers, a centrally located valve manifold and interconnecting piping requiring minimal space and field assembly. The process piping network for the MODEL 12-40 SYSTEM accommodates operation of the adsorbers in series (with either adsorber placed in first stage) or parallel. The valve manifold can be configured to isolate either adsorber from the flow, which permits carbon exchange or backwash operations to be performed on one adsorber without interrupting treatment. Each vessel is provided with GAC fill and discharge pipe including appropriate quick connect fittings for connection to water and compressed air sources. All valves and accessories are located at low elevations for ease of operation and maintenance.

The MODEL 12-40 SINGLE is delivered as a single adsorber with process pipe extending to grade. The single vessel is typically provided for systems consisting of multiple units operated in parallel. Process valves are not part of the standard package but

can be supplied as an option. The vessel is provided with GAC fill and discharge pipe including appropriate quick connect fittings for connection to water and compressed air sources. All valves and accessories are located at low elevations for ease of operation and maintenance.

The MODEL 12 vessels – either systems or single vessels – are provided with features common in either configuration:

- The unique internal cone under-drain design provides for the efficient collection of treated water and the distribution of backwash water. The internal cone also insures efficient and complete discharge of spent carbon from the adsorber without the need to open the manway to manually wash out the residual spent carbon.
- In bed sample ports. The MODEL 12 vessel is provided with three (3) nozzles located along the straight side of the vessel. These nozzles can be fitted with in-bed sample assemblies which allow the operator to monitor the progress of the adsorbent as it flows through the bed. For the MODEL 12-40 SYSTEM in-bed sample assemblies are an option. For the MODEL 12-40 SINGLE in-bed sample assemblies are standard.
- The MODEL 12 vessel is provided with one (1) GAC fill line and two (2) GAC discharge lines. The multiple discharge lines are positioned to each extract 20,000 pounds of spent carbon. This feature minimizes the time required for GAC exchanges by eliminating the guesswork of loading the spent to the trailers. The one (1) side mounted discharge nozzle is provided with a stainless steel insert which has two functions. The stainless nozzle projects into the vessel and protects the lining during carbon exchange. Also, since GAC can vary in density depending on starting material and activity, the discharge nozzle inserts can be rotated 360 degrees to accommodate the differing densities. If the nozzle insert wears away, it is designed to be easily removed and replaced.
- The MODEL 12 vessel is sized to contain 40,000 lbs of GAC and to allow for backwash expansion of approximately 25% contained within the straight side of the vessel.

The pre-engineered MODEL 12-40 design assures that all adsorption system functions can be performed with the system as provided. Standard designs have the benefit of Calgon Carbon's extensive expertise and have been proven in numerous applications. The engineering package can be provided quickly and the system expedited through Calgon Carbon's production capabilities.

#### 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.

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The MODEL 12-40 system is designed for use with Calgon Carbon's closed loop carbon exchange service. Using specially designed carbon transport trailers, the spent carbon can be removed from the adsorber via pressurized carbon-water slurry and fresh carbon refilled in the same manner. This closed loop transfer is accomplished without exposure of personnel to either spent or fresh carbon. Calgon Carbon can also manage the disposition of the spent carbon, which is typically returned to Calgon Carbon for reactivation – avoiding the need for the site to arrange for disposal.

Carbon Adsorbers	System Single	
Carbon Steel ASME code pressure vessels	✓	✓
Internal vinyl ester lining (nominal 35 to 45 mil) where GAC contacts steel for potable water and most liquid applications	✓	✓
Polypropylene slotted nozzles for water collection and backwash distribution	✓	✓
<b>Standard Adsorption System Piping</b>	✓	✓
Schedule 40 carbon steel process piping with cast iron fittings	✓	✓
Cast iron butterfly valves for process piping	✓	●
Full bore stainless steel ball valves for GAC fill and discharge	✓	✓
PPL lined steel pipe for GAC discharge	✓	✓
Pressure relief using graphite rupture discs	✓	✓
Pressure gages to measure pressure drop across system and each adsorber	✓	✓
<b>System External Coating</b>	✓	✓
High solids epoxy paint system	✓	✓
System skid, shipped separately, upon which system components can be assembled	●	●
In-bed water sample collection probes	●	✓

✓ Included as Standard      ● Available as Option



### Dimensions and Field Conditions MODEL 12-40

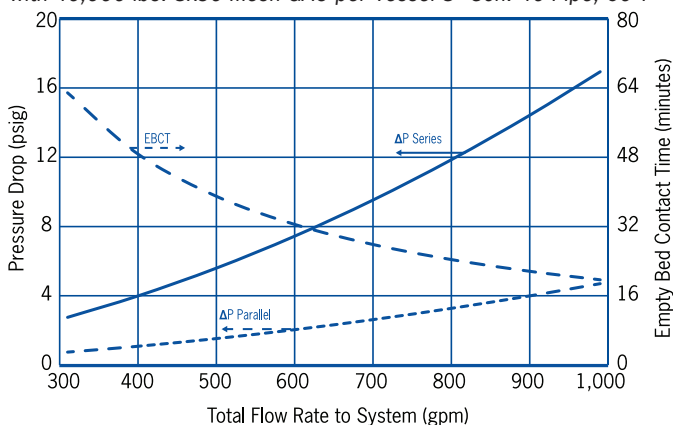
Adsorber Vessel Diameter	12' (3,660 mm)
Process and Backwash Pipe	8"
Process Pipe Connection	125# ANSI flange
Utility Water Connection	3/4" hose connection
Utility Air Connection	3/4" hose connection
Carbon Hose Connection	4" Kamlock type
Backwash Connections	8" flange
Drain/Vent Connection	8" flange
Adsorber Maintenance Access	20" round flanged man-way, 14" x 18" man-way below cone
Adsorber Shipping Weight	25,400 lbs. empty (11,550 kg)
System Operating Weight	385,000 lbs. (175,000 kg)

### Operating Conditions MODEL 12-40

Carbon per Adsorber	40,000 lbs. (18,180 kg)
Pressure Rating	125 psig (862 kPa) @ 140°F
Pressure Relief	Graphite rupture disk (125 psig)
Temperature Rating	140°F maximum (60°C)
Backwash Rate	Typical 1,700 gpm (25% expansion)
Carbon Transfer	Air pressure slurry transfer
Utility Air	100 scfm at 30 psig (reduce to 15 psig for trailer)
Utility Water	100 gpm at 30 psig
Freeze Protection	None provided; enclosure or protection recommended

### Pressure Drop Model 12-40 System

with 40,000 lbs. 8x30 Mesh GAC per Vessel 8" Sch. 40 Pipe, 60°F



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