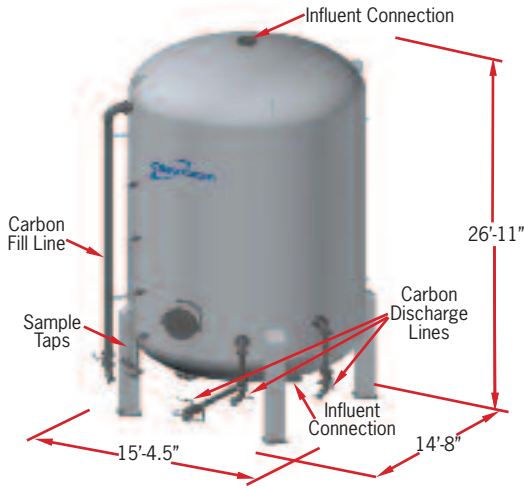


Model 14

Modular Carbon Adsorption Vessel



Description

The Calgon Carbon MODEL 14 is an adsorption vessel 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 vessel is sized to hold 60,000 pounds of GAC which provides the additional contact time required to remove either compounds at low concentrations or poorly adsorbing compounds. The standard design is a single vessel concept where a number of MODEL 14 vessels are configured for parallel operation. As an option, two vessels can be combined with a centralized pipe manifold to allow for series operation. This flexibility of configurations allows the engineer to select the alternative that best meets the requirements of the site and treatment objectives.

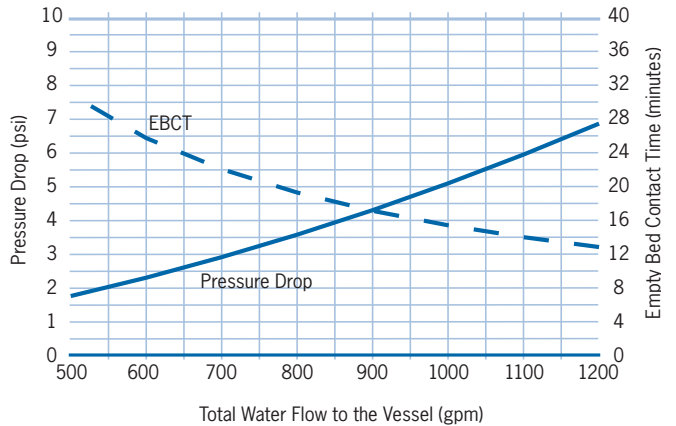
The MODEL 14 vessel is provided with one (1) GAC fill line and three (3) GAC discharge lines. The multiple discharge lines are positioned to each extract 20,000 pounds of spent carbon. This feature minimizes the time required for GAC exchanges by eliminating the guesswork of loading the spent to the trailers. The two (2) side mounted discharge nozzles are provided with stainless steel inserts which have two functions. The stainless nozzles project into the vessel and protect the lining during carbon exchange. Also, 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 replaced. The design has the benefit of Calgon Carbon's extensive expertise and has been proven in numerous applications. The engineering package can be provided quickly and the system expedited through Calgon Carbon's production capabilities.

The MODEL 14 is provided with three (3) in-bed sample assemblies which allows the operator to monitor the progress of the adsorbent as it flows through the bed.

All valves and accessories are located at low elevations for ease of operation and maintenance.

Pressure Drop

Model 14 Single Vessel Operational Pressure Drop and EBCT
60,000 lbs. GAC 8x30 Mesh, 10" Pipe, 60



The MODEL 14 is designed with a unique internal cone under-drain that provides for the efficient collection of treated water and the distribution of backwash water. Also, the internal cone ensures 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.

The MODEL 14 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 a 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; typically returned to Calgon Carbon for reactivation avoiding the need for the site to arrange for disposal.

Carbon Adsorbers

- Carbon Steel ASME code pressure vessels
- Internal vinyl ester lining (nominal 35 to 45 mil dft where GAC contacts steel) for potable water and most liquid applications
- Polypropylene slotted nozzles for water collection and backwash distribution

Standard Adsorption System Piping

- Full bore stainless steel ball valves for GAC fill and discharge
- PPL lined steel pipe for GAC discharge
- 4" Schedule 40 Carbon Steel Pipe
- Three (3) In-Bed Sample Collection Probes

System External Coating

- High solids epoxy paint system

Dimensions and Field Conditions	Model 14
Adsorber Vessel Diameter	14'-0" (4,267 mm)
Influent and Effluent Connections	10"
Process Pipe Connection	150# ANSI flange
Utility Water Connection	3/4" hose connection
Utility Air Connection	3/4" hose connection
Carbon Hose Connection	4" quick disconnect type
Seismic Design	Meet IBC 2006, Ss=0.50 Site Class D,I=1.25
Adsorber Maintenance Access	20" round flanged man-way, 14" x 18" man-way below cone
Adsorber Shipping Weight	40,500 lbs. empty (18,410 kg)
System Operating Weight	281,000 lbs. (127,730 kg)

Operating Conditions	Model 14
Carbon per Adsorber	60,000 lbs. (27,240 kg)
Pressure Rating	125 psig (862 kPa) @ 140°F
Pressure Relief	Provided by the Customer
Temperature Rating	140°F maximum (60°C)
Backwash Rate	30% Expansion BW Rate 2,600 gpm 8x30 mesh GAC at 60°F
Carbon Transfer	Air pressure slurry transfer
Utility Air	100 scfm at 30 psig (reduce to 15 psig for trailer)
Utility Water	200 gpm at 30 psig
Freeze Protection	None provided; enclosure or protection recommended

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.



Three Model 14 Vessels Operating in Parallel



Model 14 Vessels with Optional 10" Pipe Manifold



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