ODOR CONTROL TECHNOLOGY SUMMARY

Technology: CARBON ADSORPTION

Description:

Carbon adsorbers are a common odor control technology. The basic objective of carbon adsorbers is to act as a dry adsorption filter for odorous air before emitting to the atmosphere. The odorous compounds are adsorbed to the surface of the carbon, which has a high surface-to-volume ratio. The carbon is then replaced or regenerated when it becomes saturated and odor breakthrough occurs. Carbon adsorbers are typically used for low concentration airstreams. They may be used either for primary odor control or for a polishing stage following a chemical scrubber or biological treatment system. They may be cost prohibitive for high concentration applications due to the high cost of carbon.

Carbon Adsorber

Carbon adsorbers typically include fiberglass vessels, which house carbon between perforated plates. A fan draws or pushes the air through the carbon adsorber.

The carbon can be impregnated with sodium hydroxide (caustic) for improved adsorption of hydrogen sulfide. The impregnated carbon can be regenerated with caustic when breakthrough occurs, but this is a very difficult process and is rarely done. Some manufacturers now offer a carbon that can be regenerated by washing with water. The carbon typically needs to be replaced after 4 – 5 regenerations.

Carbon adsorbers are easy to install and maintain, require no chemical storage or handling, require a relatively small footprint, and typically guarantee 99.9% hydrogen sulfide removal efficiencies. Disadvantages include the high cost of carbon and the required disposal of used carbon. Carbon is also not recommended with high moisture air, which saturates the carbon bed too quickly. Carbon is commonly used in remote locations such as pumping station wet wells.

Applicable Treatment Processes:

All liquid treatment plant processes, pump stations, sludge thickening, sludge dewatering.

Typical Design Criteria:

Air flow velocity	50 – 75 fpm
Detention time	3 - 4 sec
Carbon bed depth	3 feet
H_2S removal efficiency	> 99%

Major Design Considerations:

a. Carbon selection

The type of carbon should be selected based on the individual application.

b. Carbon bed depth

Bed depth is dependent on odorous compound concentrations. Dual beds may be designed for higher air flows where there are site size restrictions.

c. Vessel size

A 12 foot diameter vessel, the largest sized vessel that can economically be transported by truck, can effectively treat up to approximately 8,000 cfm in a single bed unit and up to 16,000 cfm in a dual bed unit.