General Description

Activated Carbon Filter (non-regenerable)

1. Adsorption

During the adsorption the contaminated air is passed through an adsorbent, wherein the harmful substances are adsorbed onto the surface. A possible adsorbent is an activated carbon filter. The loose activated carbon bed has a very large surface area and thus enables a long service life.

2. Principle of operation

The activated carbon filter is constructed in layers. The bottom layer consists of a hollow space in which the air is blown with the help of the fan. Through frequency converters or butterfly vales the airflow rate to the filter can be adjusted.

Over the hollow space is a grid, which ensures that the activated carbon does not slip down. On the grid is the activated carbon bed.

In the filter the air moves slowly through the activated carbon bed where the malodorous organic compounds are adsorbed. After treatment the clean air is discharged into the atmosphere via the clean air outlet.

Through sampling nozzles, the saturation activated carbon bed are measured, which indicates if the carbon is loaded and the regeneration is required. To regenerate it, the carbon has to be rinsed with fresh water.

Activated carbon filters are used for example in pumping stations, in pharmaceutical productions, in the mechanical-biological waste treatment or solvent removal.

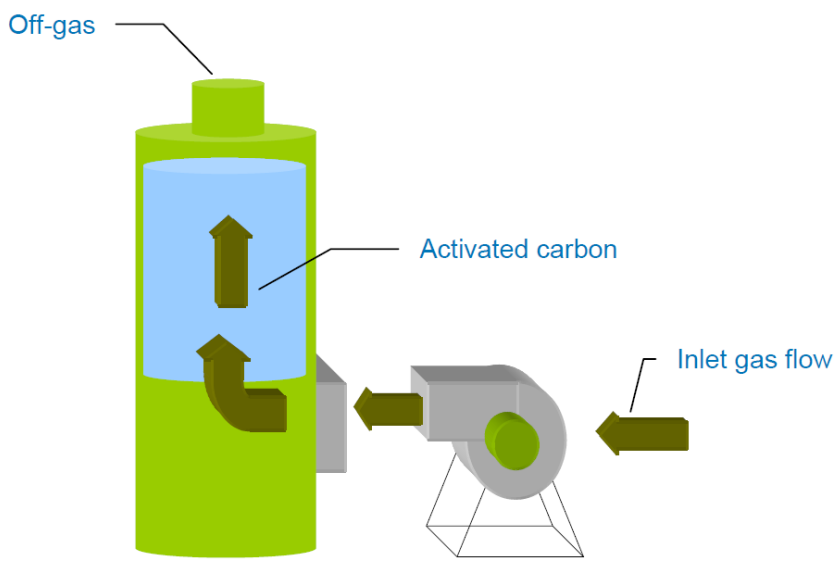

Fig. 1: Principle

3. Activated carbon

The Tholander activated carbon filters are designed to remove at least 99% of odor relevant gases in wastewater processes in a temperature range of 5 to 60 ° C and a relative humidity of 10 to 90%.

3.1 Properties of the activated carbon

3.1.1 Low pressure loss

The activated carbon is characterized by high hardness and abrasion resistance, while providing a low pressure drop.

3.1.2 Specially designed for waste and wastewater plants

A special treatment of the carbon gives the high adsorption capacity with respect to volatile organic compounds, hydrogen sulfide and mercaptans, that pollutants which are mainly responsible for the bad odors in wastewater processes.

On the surface of activated carbon, hydrogen sulfide gas will be adsorbed and converted catalytically to sulfuric acid ($H_2S + 2O_2 \longrightarrow H_2SO_4$), with which small concentration of ammonia can be removed as well.

3.1.3 Unique performance at high humidity

Because its ability to work efficiently with high humidity (up to 90%), this activated carbon is particularly well suited for the treatment of moist air out of the sewers and sewage treatment plants.

3.2 Replacement of the activated carbon

If the carbon is completely loaded, it must be replaced. For this purpose, the manhole cover at the side or top of Filter has to be opened to remove the loaded carbon and install new activated carbon.

Fig. 2: Activated carbon

4 Filter

4.1 Adsorber vessel

The activated carbon filter consists of a rectangular or cylindrical container with a flat bottom and a flat or domed roof. The container is constructed of corrosion-free glass fiber reinforced plastic (GRP) and manufactured by hand laminate. This laminate is made of high-quality polyester resin and glass fiber mats. The inside of the container is coated with a special chemical protection layer. The outside is coated with a pigment layer which serves as a UV absorber.

The container is designed for a maximum operating pressure of 3 kPa and a maximum temperature of 60 °C. All system components are constructed of materials which are adapted to the respective operating conditions.

4.2 Accessories

4.2.1 Sampling nozzle

Each adsorption system has minimum three sampling nozzles at different locations of the filter, for example to take samples or to measure the loading of the activated carbon. The nozzles are closed with stopper.

4.2.2 Media saturation measurement

Through sampling ports and our reliable measurement methods, the breakthrough of contaminants through the activated carbon bed can be realized. This allows the operator to check for the presence of hydrogen sulfide, below the carbon bed or at any of the sampling ports within the carbon bed. Thereby the operators can predict when the carbon must be replaced or regenerated.

4.2.3 Differential pressure measurement

The principle of the differential pressure measurement is based on the measurement of the difference of two different pressures and is used to monitor the pressure filter. The pressure can change for example when the carbon bed material is clogged or the fan is not working properly.

As a standard, mechanical pressure gauges are used. Optionally, electronic instruments with the possibility of signal transmission can be used.

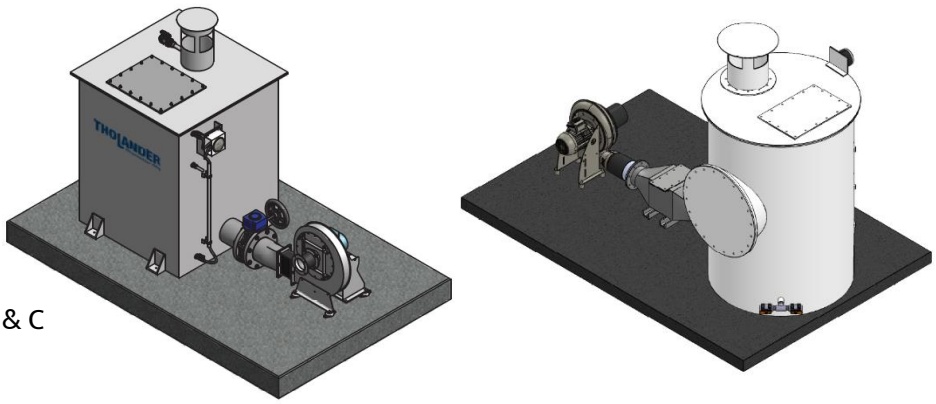

Fig. 3: Standard ACF-010-G-R & C