5.5.3 Flares

Flare systems are primarily used to handle large amounts of waste gas or vapors. Gas containing organics is continually fed to and discharged from a stack, with the combustion occurring near the top of the stack and characterized by a flame at the end of the stack. Although flares can be used to destroy organics in accordance with Subpart CC standards, such system can present safety problems including explosion and thermal-radiation hazards from the flame.

The heat content of the waste stream to be disposed is an important consideration in the design and operation of a flare. The gases can either support their own combustion or not. In general, a heating value greater than 7443 kJ/m³ can be flared successfully. If the heating value is below 7443 kJ/m³ it may be necessary to enrich the waste gas by injecting another gas with a higher heating value. Gases with a heating value as low as 2233 kJ/m³ have been flared but at a significant fuel demand. It is usually not feasible to flare a gas with a heating value below 3721 kJ/m³.

5.5.4 Enclosed Combustion Devices

An enclosed combustion device may be used to reduce organic air emissions of Subpart CC units by 95 percent or greater. Some examples of enclosed combustion devices are thermal vapor incinerators, boilers and process heaters.

Examples of Enclosed Combustion Devices

<table>
<thead>
<tr>
<th>Thermal vapor incinerator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal vapor incinerators can be used over a fairly wide but low range of organic vapor concentrations. The concentration of the organics in the air stream that is to be treated must be substantially below the lower flammable level (lower explosive limit). Reactions are conducted at elevated temperatures to ensure high chemical-reaction rates for the organics. Thermal vapor incinerators are equipped with a burner at one end that fires a fuel. There is also a fume inlet near the burner where the gas stream to be oxidized enters the incinerator. The burner may utilize the air in the waste stream as the combustion air for the fuel or it may use a separate source of outside air for this purpose. Thermal vapor incinerators generally operate at a temperature between 1300 to 1600 °F.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Catalytic vapor incinerators</th>
</tr>
</thead>
<tbody>
<tr>
<td>A catalytic incinerator provides contact of a waste stream with a catalyst bed. This allows oxidation reaction to occur rapidly in the temperature range of 700 to 900°F, in contrast to the 1300 to 1600°F required for thermal vapor incinerators. The heat required to bring the waste stream up to the required oxidation temperature is usually supplied by a fuel burner. The catalyst bed is located at a distance downstream of the mixture of combustion products and waste gas stream.</td>
</tr>
</tbody>
</table>
Examples of Enclosed Combustion Devices

Boilers

Boilers have been designed to burn a wide range of fuels. Boilers are steam generators that provide power, steam, or both to an industrial plant. Boilers are employed over a wide range of applications from large power-generating units to small low-pressure units used for space or process heating.

Process heaters

Process heaters transfer heat liberated by burning fuel to fluids contained in tubes.

5.5.5 Inspection and Monitoring Requirements

Condenser

If a condenser is used, the owner or operator has two choices for monitoring the unit. The first option is a monitoring device equipped with a continuous recorder to measure the concentration level of the organic compounds in the exhaust vent stream from the condenser. This value will be used to show that there is 95 percent reduction of organics in the waste stream. The other option is to install a temperature monitoring device equipped with a continuous recorder. This device must be installed at a location in the exhaust vent stream from the condenser. This location was selected because the monitoring of the gas exhaust provides a direct characterization of the performance of the condenser. The temperature monitoring device must operate with an accuracy of \(+0.01\) percent of the temperature being monitored in \(\degree C\) or \(+0.5\) \(\degree C\). This measurement will indicate if the condenser is operating at optimum capacity in order to reduce organics by 95 percent or greater.

Carbon Absorber

When a carbon adsorber is used the owner or operator must monitor the unit to determine when breakthrough has occurred. If the unit is a fixed-bed carbon adsorber that regenerates the carbon bed directly in the control device, the owner or operator has two options for monitoring. The first is to install a continuous recorder to monitor the organic concentration in the exhaust vent stream from the carbon bed. A large increase in organic concentration would indicate that breakthrough has occurred and that the carbon needs to be regenerated. If there are no large increases of organic concentrations, the adsorber is being regenerated before breakthrough has occurred and will continue to operate at optimum capacity. The other option, is to install a monitoring device equipped with a continuous

Additional information regarding carbon absorption systems can be found in Carbon Bed Fires and the Use of Carbon Canisters for Air Emission Controls on Fixed Roof Tanks.