WESTATES® OXIDATION RESISTANT ACTIVATED CARBONS - LORISE TREATMENT PROCESS

FOR VAPOR PHASE APPLICATIONS AT RISK OF TEMPERATURE EXCURSION OR EXOTHERMIC REACTIONS THAT MAY LEAD TO CARBON BED IGNITION

Description

The use of activated carbon in industrial vapor control system store move volatile organic compounds from process and ventilation air streams is very common. This adsorption process is exothermic (liberates heat) and will lead to a temperature rise within the carbon bed. A documented problem in some of these adsorption applications, however, is the formation of an excessive temperature rise that may lead to a thermal runaway in the carbon bed. An excessive temperature rise occurs when the heat of adsorption plus the heat of reaction of the adsorbed organics exceeds the removal of heat by conductive or convective cooling. Certain compounds, particularly ketones such as Methyl Ethyl Ketone (MEK) or Cyclohexanone are particularly prone to auto oxidation once adsorbed onto activated carbon.

While there are no foolproof methods to guarantee the prevention of carbon bed temperature excursions, Evoqua Water Technologies' scientists have developed the LoRise process, a patented (US Patent #6,425,941) method to reduce the inherent potential for the excessive liberation of heat in the carbon bed. Through the impregnation of selected activated carbons with Butylated Hydroxytoluene (BHT), an antioxidant and free radical scavenger, the potential for excessive temperature excursions is greatly reduced.

Laboratory studies conducted by Evoqua simulated a vapor stream containing 1000 ppmv of gasoline, and showed that while a standard carbon exhibited a significant uncontrolled temperature rise, the temperature in the LoRise treated bed remained well below the oxidation initiation temperature for gasoline. Similar results for LoRise treated carbon were seen with MEK as the challenge contaminant (see Figure 1).

Warning: The phenomenon of temperature excursions within carbon beds is difficult to predict (see warning on back page of this bulletin). Prior to applying LoRise treated products to your application, we recommend that you discuss your application with your Evoqua Water Technologies Technical Sales Representative.

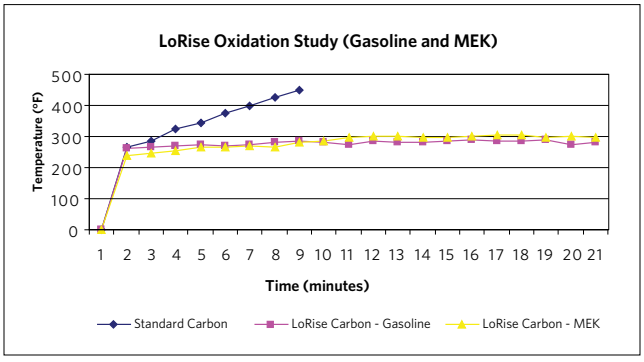


Figure 1

Quality Control

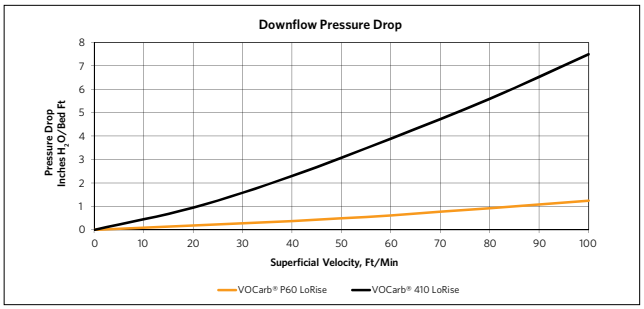
All VOCarb® activated carbons are extensively quality checked at our State of California certified environmental and carbon testing laboratory located in Los Angeles, CA. Evoqua's laboratory is fully equipped to provide complete quality control analyses using ASTM standard test methods in order to assure the consistent quality of all VOCarb carbons.

Our technical staff offers hands-on guidance in selecting the most appropriate system, operating conditions and carbon to meet your needs. For more information, contact your nearest Evoqua representative.

Features and Benefits:

- High VOC adsorption capacity
- Superior hardness minimizes attrition losses during handling, use and service
- Easily reactivated for recycle and reuse
- Low pressure drop characteristics
- Backed by technical support and a strong QA/QC program

The LoRise process can be applied to both virgin and reactivated activated carbons in a variety of mesh sizes. The following information pertains to the most common grades of LoRise treated carbon available: VOCarb® 410 LoRise and VOCarb® P60 LoRise Carbons. For information on applying our LoRise process to another base carbon, please contact your Evoqua Water Technologies Technical Sales Representative.



Warning: The adsorption of organic compounds onto activated carbon generates heat. In rare instances, adsorbed compounds may also react on the carbon surface to generate additional heat. If these heat sources are not properly dissipated, the carbon bed temperature may rise to the point where the carbon can ignite, leading to a fire or other hazardous condition. A description of industry accepted engineering practices to assure the dissipation of heat and safe operation of the carbon bed can be provided upon request. In certain applications where the risk of ignition is significant, activated carbon may not be a recommended treatment technology. Please contact your Technical Sales Representative for more details.

Wet activated carbon readily adsorbs atmospheric oxygen. Dangerously low oxygen levels may exist in closed vessels or poorly ventilated storage areas. Workers should follow all applicable state and federal safety guidelines for entering oxygen depleted areas.

TYPICAL PROPERTIES

Parameter	VOCarb® 410 LoRise Carbon	VOCarb® P60 LoRise Carbon
Carbon Type	Bituminous Coal	Anthracite Coal
Mesh Size, U.S. Sieve	4 x 10	4 x 6
Butane Activity[1]	19.5	19.5
Hardness No., Wt. %	90	90
Moisture as Packed, Wt. %	2	2
Apparent Density, g/cc	0.48 – 0.55	0.48 – 0.55
Mean Pellet Diameter, mm	-	4.0
CTC Activity[1]	50	50

[1] Butane activity (D5742) has been adopted by ASTM as a replacement for CTC activity (D3467) as a test method for estimating the micropore volume of an activated carbon.

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