Air quality section only
10-29-2014

X.x Air quality for enclosed systems using chlorine or bromine

For those systems utilizing chlorine or bromine as one of their disinfection methods and the system is enclosed, the internal air quality shall be tested to meet ANSI/ASHRAE 62.1-2007, providing:

- Ten Complete filtered air exchanges within the unit to meet exposure limits for ozone, carbon dioxide, chloroform/bromoform, chloramines, chlorine, bromine, and carbon tetrachloride; (insert air exposure limits for these chemicals based on short and longer (8hrs) within pod/chamber)

- The cleaning system utilized shall not impart ozone according to the MAHC (section 4.xxx?), or other harmful gasses (define gases) above OSHA limits (define limits) of exposure to system users during their floatation session (also consider longer exposure – maybe list both?) TLV weighted for 8 hour exposure

- The treatment cycle incorporates UV and Ozone treatment to achieve oxidation reduction potential (ORP) of 750 mV per 20 minute cleaning cycle.

- The system holds up to 300 gallons (L equivalent). (Not relevant, if the treatment system can be used on various tank sizes or volumes testing shall occur on the largest tank design based upon water and air volume).

The manufacturer shall provide the disinfection type, humidity and water temperature for normal operating conditions to perform this test of internal air quality within the pod or unit.

From a public health point of view, air testing may prove to be the most important aspect for ensuring the safety of the individual inside of a float tank. The enclosed environment and the need to maintain stillness and silence in the air make it challenging to safeguard the floater from inhaling harmful gases. At a minimum, I believe there are 3 tests that should be conducted (see below), with all measurements taken immediately above the water line at the approximate location of air space where the floater is breathing. I also think we should stray away from the 10 air changes per hour. This may be unnecessarily prohibitive and take away from the actual float experience. Perhaps if the 3 requirements below are met, we don’t need to specify the number of air changes? Finally, we may want to consider measuring the transmission of certain airborne viruses and bacteria that can be transmitted from one floater to another.

(1) For all enclosed float tanks, carbon dioxide (CO2) testing should establish that levels throughout a float never surpass an operationalized threshold. Preliminary data has shown that CO2 levels gradually rise over the course of a float. Since some individuals float for extended periods of time, it is critical that CO2 levels be monitored for at least 2 hours during the testing. I would suggest 1000ppm be considered as the operationalized threshold, as recommended in ASHRAE Standard 62-1989. Maintaining CO2 below 1000ppm will ensure the maximal comfort of the floater and prevent CO2 from reaching potentially harmful levels.

1) The suggestion for a testing method to assess CO2 gas accumulation is critical for Float systems that do not have forced air circulation. Its probably a good idea to check even for those systems that do have forced air circulation (even at the ASHRAE flow levels). The issue is proposing a proper testing method noting where to feed and how much CO2 to feed into the floatation system over a 1hr, 2hr, or longer period of time. Good discussion topic from our last meeting. In the absence of a specific method it may be possible to measure CO2, VOCs or other easily measured indicators of gases in the headspace above the water level in a floatation system.
Air quality section only
10-29-2014

(2) For any float tank that utilizes ozone as a method of disinfection, the floater should not be allowed to enter the tank until residual ozone levels in the air are less than an operationalized threshold. I would suggest 0.1ppm be considered as the operationalized threshold, as recommended by both OSHA and NIOSH.

-Excellent, NSF fully supports this approach and has already addressed this issue via 2 separate sets of testing for the already NSF Certified Floatation System (For FloatLab). This was already addressed two ways:

1) in the NSF CCS12804 document (see section on Ozone) and its referene to NSF 50 for testing of ozone off gasing.

2) Further work was done by NSF as part of our electrical certification of an entire floatation system to address ozone off gassing via sampling at various locations throughout the space above the water in the floatation chamber.

3) Further the Floatlab system incorporates an air filter and forced air circulation system as additional levels of design and user protection.

(3) For any float tank that utilizes chlorine or bromine as a method of disinfection, it is critical that potentially hazardous byproducts be measured in the air and fall under an operationalized threshold. These disinfectants are known to merge with organics to create dangerous and carcinogenic byproducts like trichloramines, chloroform, and even cyanide. Testing needs to be conducted using water that contains organic material commonly found in the float tank such as sweat and urine. Operationalized thresholds need to be determined for each harmful byproduct.

1) For those manufacturers that require feeding halogen disinfectants (those with Cl/Br) it is very wise to have a forced air system and or some testing program to assess likely created DBPs. The suggestion for a testing method to assess the wide potential variety of gases is challenging of course. It likely that such gases could accumulate at the water level in a non forced air enclosed space. Therefore it is critical for Float systems that do not have forced air circulation and use Cl/Br to have verifiable laboratory testing to defend such a system and operational method as not creating unsafe indoor air quality or excessive DBPs. As with CO2, it's probably a good idea to check even for those systems that do have forced air circulation (even at the ASHRAE flow levels). The issue is proposing a proper testing method noting where to feed and how much organic matter or Synthetic Bather Load (SBL) to feed into the floatation system over a period of time and then operating the system and sampling before and during use over time to assess risk. This too is a good discussion topic from our last meeting. If the group is unable to develop an overall method or specific target compounds or specific and appropriate laboratory sampling and analysis methods the intent of the testing and investigation may be best met via measurement of VOCs or other easily dosed and measured indicators of gases in the headspace above the water level in a floatation system.