

APPENDIX C - CONFINED SPACE ATMOSPHERIC TESTING

Atmospheric monitoring of a confined space is conducted using a direct reading gas detection instrument (DRI). Monitoring is conducted within confined spaces to verify that there is adequate oxygen for breathing and to confirm that there space is free of explosive or toxic air contaminants. The instrument must have:

- a legible, real-time display of the contaminant concentrations
- a visible/audible alarm that trips when concentrations exceed established limits
- a pump that can draw the air sample from within the space to provide more representative measurements of the atmosphere

Common DRI, also referred to as four-gas or multi-gas meters, usually come standard with oxygen and explosive gas detectors and can be outfitted with additional sensors specific to the hazards (such as hydrogen sulfide, carbon monoxide, carbon dioxide, ammonia, chlorine) found to be present in a space or facility. A sampling probe with tubing is a recommended accessory that enables samples to be collected from a distance so that measurements can be completed from outside of the space. A DRI should be operated only by trained individual, must be calibrated before use and be maintained on a regular basis. A confined space may not be entered until the atmosphere has been sampled and confirmed to be free from hazardous conditions.

Confined Space Gas Sampling Procedure

1. Pre-use verification of accuracy (Bump Test) of the gas detector using calibration gas. Document result of test on Company required document. (Note: this document is the one your company program requires that you use.) If a calibration is required, follow the manufacturer's calibration procedure. Document the calibration on a log. If you are ever audited, it is always in your best interest to have proof that you consistently calibrate the equipment. If something goes wrong during the entry, proper documentation will be essential.
2. Open the space and begin mechanical ventilation. Rule of thumb is 15 to 20 minutes of mechanical ventilation

prior to taking your sample of the atmosphere inside the space. First, it is unlikely a newly opened space will have clean breathable atmosphere. Second, exposure to excess humidity like CIP mists, will clog the detector's filters and sensor surfaces. Humidity will fog mirrors in IR sensors. This will interfere with accurate sampling and can damage your equipment. (Your best use of time may be to open the space and let it air out, while you do your bump test/ calibration.)

3. When you are ready to sample, turn off the ventilation. Your sample needs to accurately record the atmosphere inside the space. If the ventilation is still forcing clean air in, you may mistakenly think you are safe to enter.
4. Perform the test on the detector's pump to make sure it is drawing atmosphere through the sample probe and tubing with no leaks.
5. Slowly insert the probe into the manway. Remember that the pump will draw no faster than 2 seconds per foot, the sensors need time to react to give you an accurate reading. This is usually 15 to 30 seconds. If you are lowering the probe from a top of space manway, lower it in about 3 feet to take your first sample. Because gases can stratify, you will take readings every 4 to 5 feet in height down to the bottom of the space. Slowly sweep the probe side to side. If you are entering through a side manway, start low and sweep side to side. Begin raising the probe higher and higher in the space while continuing to sweep side to side.
6. Watch the display for any changes in the readings. If you see a change, restart your ventilation right away. Any change in display means you can't enter, don't waste the time to sample the entire space. Run ventilation for another 5 minutes, and re-start the sampling process again.
7. When you have a clean atmosphere, document the readings on your entry documents, sign legibly and include the time and date. Make sure you keep these documents on file as required by OSHA Regulations.

It is recommend that you keep notes about each space. Over time, you will learn what needs to happen for the sampling of each space to reach a clean breathable atmosphere. One space may take 15 minutes and another may take a lot longer. Plan other tasks that you can complete while you wait to document your safe entry.