

**FIELD PROCEDURE 21**  
**Volatile Organic Compound Leaks**

*Note: A leak definition concentration based on a reference compound is specified in each applicable regulation. This procedure is intended to locate and classify leaks only, and is not to be used as a direct measure of mass emission rates from individual sources. The data sheets (FDS and CDS) serve as a summary; hence, there is no Summary Sheet.*

**A. Pretest Preparations**

Calibrate and check the instrumentation according to CP 21.

**B. Type I - Leak Definition Based on Concentration**

1. Place the probe inlet at the surface of the component interface where leakage could occur. Move the probe along the interface periphery.
2. If the meter reading increases, slowly sample the interface until the maximum reading is obtained. Hold this position for about two times the instrument response time.
3. Record and report all maximum observed meter reading >LDC as specified in the regulation reporting requirements.
4. Examples of the application of this general technique to specific equipment types are:
  - a. Valves - Circumference of stem exiting the packing and flange periphery. Survey valves of multipart assemblies where a leak could occur.
  - b. Flanges and Other Connections - Outer edge of the flange-gasket interface and circumference of the flange.
  - c. Pump or Compressor Seals - If applicable, determine the type of shaft seal. Survey local area ambient VOC concentration and determine if detectable emissions exist.
  - d. Pressure Relief Devices - For those devices equipped with an enclosed extension, or horn, the center of the exhaust area to the atmosphere.
  - e. Process Drains - For open drains, as near as possible to the center of the area open to the atmosphere. For covered drains, surface, periphery of the cover.
  - f. Open-ended Lines or Valves - Center of the opening to the atmosphere.

g. Seal System Degassing Vents, Accumulator Vessel Vents, Pressure Relief Devices - If applicable, emission points in ducting or piping before the control device.

h. Access Door Seals - Door seal interface and periphery.

**C. Type II - "No Detectable Emission"**

1. Determine the ambient concentration around the source by moving the probe randomly upwind and downwind 1 to 2 meters from the source or, if interferences exist, closer to the source down to 25 cm. Then move the probe to the surface of the source and measure as in section B. Determine the difference. When the regulation also requires that no detectable emissions exist, visual observations and sampling surveys are required.
2. Examples of this technique are:
  - a. Pump or Compressor Seals.
  - b. Seal System Degassing Vents, Accumulator Vessel Vents, Pressure Relief Devices - Any vents upstream of the device.

**D. Alternative Screening Procedure**

1. A soap solution may be used under the following conditions:
  - a. No continuously moving parts.
  - b. Surface temperatures >freezing point of the soap solution or <boiling point.
  - c. No open areas that the soap solution cannot bridge.
  - d. No evidence of liquid leakage.
2. Spray a soap solution over all potential leak sources. No bubbles indicate no detectable emissions or leaks.
3. If any bubbles are observed, use the instrument techniques (section B or C).



**CALIBRATION PROCEDURE 21**  
**Volatile Organic Compound Leaks**

**A. Procedure**

1. From the regulations, determine the leak definition concentration (LDC) and reference compound, e.g., 10,000 ppm as methane.
2. For the calibration gases, obtain a manufacturer-certified reference compound at about the LDC and zero gas (air, < 10 ppm VOC).
3. Determine the species of organic compounds to be measured and obtain gases of known concentrations (in air) at about 80% LDC or, if limited by volatility or explosivity, 90% of the standard saturation concentration or 70% of the lower explosive limit, respectively.
4. Assemble the equipment in the configuration to be used and start up the instrument according to the manufacturer's instructions.
5. Calibrate the instrument with the reference compound. If the meter readout cannot be adjusted to the proper value, take corrective actions before proceeding.
6. Determine the response factor for each of the organic species in step A3 as follows (this step need not be repeated at subsequent intervals):
  - a. Run triplicates, alternating between the known mixture and zero gas.
  - b. Calculate response factors for the individual compounds (must be < 10).
7. Determine the calibration precision initially and at subsequent 3-month intervals or at the next use, whichever is later, as follows:
  - a. Run triplicates, alternating between zero and the calibration gas without any adjustments to zero and span.
  - b. Calculate the precision (see CDS 21) from the three values (must be  $\leq 10\%$ ).
8. Determine the response time, initially and whenever the sample pumping system or flow configuration is modified such that it would change the response time, as follows:
  - a. Run triplicates. Introduce zero gas into the instrument sample probe. When the meter reading has stabilized, switch quickly to the calibration gas.
  - b. Measure the time from switching to when 90% of the final stable reading is attained.
  - c. Calculate the average response time (must be  $\leq 30$  sec).

**B. Alternatives**

1. Rather than certified calibration gases, the user may prepare the calibration gases using any accepted gaseous preparation procedure that will yield a mixture accurate to  $\pm 2\%$ . Replace these prepared standards daily unless it can be demonstrated that degradation does not occur during storage.
2. Rather than the reference compound, another compound may be used as the calibration gas provided that a conversion factor is determined.
3. Published response factors for the compounds of interest for the instrument or detector type may be used instead of actual measurements. See the references in Method 22.

