

Question 8.36

Topic: Use of Multi-hole Sampling Probes

Question: Is the use of a multi-hole sampling probe permitted when conducting the RATA for an SO₂, NO_x, CO₂, or O₂ monitoring system, in lieu of physically moving a sampling probe to capture data at the required traverse points?

Answer: EPA permits only one type of multi-hole sampling probe to be used to conduct Part 75 RATAs, as discussed below under "Multi-hole Probes (EPA Evaluation)."

A. Background

For relative accuracy test audits (RATAs) of gas monitors, Part 75, Appendix A, § 6.5.6 defines the number and location of the required reference method sampling points. In general, three sampling points are used, unless the unit qualifies to use a single reference method point, as described in Appendix A, § 6.5.6(b)(4).

Sampling at multiple traverse points is usually necessary in a RATA, to ensure that the reference method results are representative of the average pollutant or diluent gas concentration in the flue gas stream and are not biased by any stratification that may exist within the flue. Then, if the CEMS passes the RATA, this confirms that the location of the CEMS sampling probe is appropriate, and that the CEMS will provide data representative of the average flue gas concentration.

The procedure for collecting the required reference method data during a gas RATA is to physically move the sample probe from traverse point to traverse point. The sampling rate is kept constant at each point, and each point is sampled for a set amount of time at each point (usually seven minutes) so that the volume of sample collected from each traverse point is equivalent to the next. The resultant value is a representative average of the pollutant or diluent gas concentration across the stack and is recorded as the run value. Probe movement can be accomplished by having a person manually move the probe during the testing or by using a mechanically automated probe, which is pre-programmed to sample at the specified traverse points sequentially.

Owners and operators have requested that EPA allow the use of multi-hole sampling probes for gas monitor RATAs, in lieu of physically moving the sampling probe as described above. Multi-hole sampling probes may serve to reduce the cost associated with RATA testing as well as to reduce the exposure time of the test personnel to the potentially hazardous conditions that may exist during RATA testing. However, as discussed in detail below, EPA has serious reservations concerning the ability of certain multi-hole probe configurations to provide representative measurements.

B. Types of Multi-hole Probes

EPA is aware of the following configurations of multi-hole sampling probes:

(1) Rake Probe: Multi-hole sampling probe configuration that consists of a single axial pipe serving as the probe, and which has multiple openings along its length through which a sample is drawn. This configuration is designed to sample multiple points simultaneously.

(2) Concurrent Sampling Bundle Probe (CSBP): Multi-hole sampling probe configuration that consists of multiple distinct sampling tubes bundled together into one probe system. Each sampling tube is of a different length to sample at one of the required traverse points. During a test run the sample is drawn through all of the tubes simultaneously and is combined into one composite sample prior to analysis. The gas flow rate through each tube could be monitored to assure that each traverse point is being sampled at an equivalent rate.

(3) Discrete Sampling Bundle Probe (DSBP): Multi-hole sampling probe configuration that consists of multiple distinct sampling tubes bundled together into one probe system. Each sampling tube is of a different length to sample at one of the required traverse points. During a test run, the sample is drawn through each of the distinct sampling tubes, one at a time.

C. Multi-hole Probes (EPA Evaluation)

EPA approves the use of only one type of multi-hole probe, i.e., the discrete sampling bundle probe described above, for Part 75 RATA testing. This configuration typically has three or more sampling tubes bound together to form one probe bundle. The sample tube positions are often adjustable in order to be applicable to various stack diameters. In this configuration each sampling tube is sampled individually, as controlled by a valve arrangement, and is analogous to the physical traversing of a stack with a probe. The total sample flow rate can be monitored and controlled at each point during the test to ensure that the volume of sample collected from each traverse point is equivalent to the next. The concurrent sampling bundle probe and rake probe may not be used for Part 75 applications (see §75.22(a)(5)(iii)).

References: §75.22(a)(5)(iii), Appendix A, Section 6.5.6

History: First published in October 2003 Revised Manual; revised in 2013 Manual