presurvey concentration determined in Section 6.1). Note: If the low level calibration gas concentration falls at or below the limit of detection for the instrument for any target pollutant, a calibration gas with a concentration at 4 to 5 times the limit of detection for the instrument may be substituted for the low-level calibration gas listed in Section 7.1.1.

7.1.1 Low-level. 40–60 percent of measured concentration.

7.1.2 Mid-level. 90–110 percent of measured concentration.

7.1.3 High-level. 140–160 percent of measured concentration, or select highest expected concentration.

7.2 Performance Audit Gas. A certified EPA audit gas shall be used, when possible. A gas mixture containing all the target compounds within the calibration range and certified by EPA’s Traceability Protocol for Assay and Certification of Gaseous Calibration Standards may be used when EPA performance audit materials are not available. The instrument relative error shall be ≤ 10 percent of the certified value of the audit gas.

8.0 Sample Collection, Preservation, Storage, and Transport

8.1 Installation and Measurement Location Specifications. Install the CEMs in a location where the measurements are representative of the source emissions. Consider other factors, such as ease of access for calibration and maintenance purposes. The location should not be close to air in-leakages. The sampling location should be at least two equivalent duct diameters downstream from the nearest control device, point of pollutant generation, or other point at which a change in the pollutant concentration or emission rate occurs. The location should be at least 0.5 diameter upstream from the exhaust or control device. To calculate equivalent duct diameter, see Section 12.2 of Method 1 (40 CFR Part 60, Appendix A). Sampling locations not conforming to the requirements in this section may be used if necessary upon approval of the Administrator.

8.2 Pretest Preparation Period. Using the procedures described in Method 18 (40 CFR Part 60, Appendix A), perform initial tests to determine GC conditions that provide good resolution and minimum analysis time for compounds of interest. Resolution interferences that may occur can be eliminated by appropriate GC column and detector choice or by shifting the retention times through changes in the column flow rate and the use of temperature programming.

8.3 7-Day Calibration Error (CE) Test Period. At the beginning of each 24-hour period, set the initial instrument setpoints by conducting a multi-point calibration for each compound. The multi-point calibration shall meet the requirements in Section 13.3. Throughout the 24-hour period, sample and analyze the stack gas at the sampling intervals prescribed in the regulation or permit. At the end of the 24 hour period, inject the three calibration gases for each compound in triplicate and determine the average instrument response. Determine the CE for each pollutant at each level using the equation in Section 9-2.

Each CE shall be ≤ 10 percent. Repeat this procedure six more times for a total of 7 consecutive days.

8.4 Performance Audit Test Periods. Conduct the performance audit once during the initial 7-day CE test and quarterly thereafter. Sample and analyze the EPA audit gases (or the gas mixture prepared by EPA’s traceability protocol if an EPA audit gas is not available) three times. Calculate the average instrument response. Report the audit results as part of the reporting requirements in the appropriate regulation or permit (if using a gas mixture, report the certified cylinder concentration of each pollutant).

8.5 Reporting. Follow the reporting requirements of the applicable regulation or permit. If the reporting requirements include the results of this performance specification, summarize in tabular form the results of the CE tests. Include all data sheets, calculations, CEMS data records, performance audit results, and calibration gas concentrations and certifications.

9.0 Quality Control (Reserved)

10.0 Calibration and Standardization

10.1 Initial Multi-Point Calibration. After initial startup of the GC, after routine maintenance or repair, or at least once per month, conduct a multi-point calibration of the GC for each target analyte. The multi-point calibration shall meet the requirements in Section 13.3.

10.2 Daily Calibration. Once every 24 hours, analyze the mid-level calibration standard for each analyte in triplicate. Calculate the average instrument response for each analyte. The average instrument response shall not vary more than 10 percent from the certified concentration value of the cylinder for each analyte. If the difference between the analyzer response and the cylinder concentration for any target compound is greater than 10 percent, immediately inspect the instrument making any necessary adjustments, and conduct an initial multi-point calibration as described in Section 10.1.
11.0 Analytical Procedure. Sample Collection and Analysis Are Concurrent for This Performance Specification (See Section 8.0)

12.0 Calculations and Data Analysis

12.1 Nomenclature.
- \(C_m\) = average instrument response, ppm.
- \(C_a\) = cylinder gas value, ppm.
- \(F\) = Flow rate of stack gas through sampling system, in Liters/min.
- \(n\) = Number of measurement points.
- \(r^2\) = Coefficient of determination.
- \(V\) = Sample system volume, in Liters, which is the volume inside the sample probe and tubing leading from the stack to the sampling loop.
- \(x\) = CEMS response.
- \(y\) = Actual value of calibration standard.

12.2 Coefficient of Determination. Calculate \(r^2\) using linear regression analysis and the average concentrations obtained at three calibration points as shown in Equation 9-1.

\[
r^2 = \left( \frac{n \sum x_i y_i - (\sum x_i)(\sum y_i)}{\left[ (n \sum y_i^2 - \sum y_i \sum y_i)(n \sum x_i^2 - \sum x_i \sum x_i) \right]} \right)^2 \tag{Eq. 9-1}
\]

12.3 Calibration Error Determination. Determine the percent calibration error (CE) at each concentration for each pollutant using the following equation.

\[
CE = \frac{C_m - C_a}{C_a} \times 100 \tag{Eq. 9-2}
\]

12.4 Sampling System Time Constant (T).

\[
T = \frac{F}{V} \tag{Eq. 9-3}
\]

13.0 Method Performance

13.1 Calibration Error (CE). The CEMS must allow the determination of CE at all three calibration levels. The average CEMS calibration response must not differ by more than 10 percent of calibration gas value at each level after each 24-hour period of the initial test.

13.2 Calibration Precision and Linearity. For each triplicate injection at each concentration level for each target analyte, any one injection shall not deviate more than 5 percent from the average concentration measured at that level. The linear regression curve for each organic compound at all three levels shall have an \(r^2 \geq 0.995\) (using Equation 9-1). For compound-specific sampling requirements refer to FTIR sampling methods (e.g., reference 1). For data reduction procedures...