Performance Specification 18 (PS18)

Initial Certification for HCL Analyzers, as an alternative to PS15 for FTIR systems

PS18 provides procedures for initial certification of HCL Analyzers located at Portland cement plants. Procedure 6 then provides ongoing quality assurance procedures for the HCL analyzers.

The performance specification (PS) tests to be completed on the CEMS are listed below (for an extractive CEMS):

1. Interference Test*
2. Response Time (RT) Test
3. Level of Detection (LOD) Determination*
4. Measurement Error (ME) Test
5. Calibration Drift (CD) Test
6. Dynamic Spiking
7. Relative Accuracy Test Audit (RATA)

**The Interference Test and Level of Detection (LOD) Determination check was performed under laboratory conditions. A separate report is provided with results from the laboratory checks.*

Extractive CEMS Procedures

Interference Test (uses Table 2)

Meets the performance requirements of section 13.5, conducted in a controlled environment, must include: analyzer, related software, and any sample conditioning equipment.

- If one facility owns multiple like configurations, only one has to be tested.
- Use an HCL reference gas concentration of approximately 5X Limit of Detection (LOD)
- Test gases must be introduced directly into the inlet to the analyzer after the probe tension coupling. Baseline vs response when adding test gases while maintaining constant HCL concentration (ppmv). Must be performed in triplicate.

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Level of Detection Determination (11.5)

Minimum amount of HCL that can be detected above background in a controlled environment using a representative gas matrix

Response Time Test

- Must determine: LOD-, ME-, and SA-RT
- ME- and LOD-RT: start upscale determination by injecting zero gas into the system, per 11.7 and 11.5, output stabilized at no change greater than 1.0 % of full scale for 30 seconds
- Introduce an upscale reference gas and record time (upscale RT) required to reach 95 percent of the change to the final stable value. Reintroduce the zero gas and record time required to reach 95% of the change to stable instrument response at zero gas reading (downscale RT)
- Repeat process until you have three sets of data and take the mean of each. Report the greater of the average upscale or downscale as the RT for the system

Measurement Error (ME) Test (11.7.2)

- Before conducting an ME, perform a Calibration drift using a zero gas as used in a 7 Day drift (11.8) and document and report the results.
- Introduce reference gases to the CEMS probe prior to the conditioning system, measure three upscale HCL reference gas concentrations, using Table 4 ranges
- Introduce gas at a rate to replace entire source gas sample, continue to add gas until response is stable (difference between two consecutive measurements is less than LOD, or within 5% of each other).
- Make triplicate measurements for each reference gas (total of 9 measurements). Order of reference gases does not matter, but cannot repeat one gas consecutively. At each reference gas concentration, determine the average of three CEMS responses (MC).
- Calculate ME using Equation 3A

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7-day Calibration Drift Test (11.8)

Must be performed prior to RA tests. Test seven consecutive days during continuous operations per procedures in 11.7. Zero gas and mid-level gas only need to be introduced once 24-hour intervals; seven consecutive days of operations (not necessarily calendar).

Dynamic Spiking

- HCL spike must not alter the total system flow rate or dilution ratio; spike gas flow rate must not be more than 10% of total system flow rate; must determine the dilution factor (DF) or relative concentration of HCL for each DS.
- This process requires annually-calibrated NIST flow meters accurate to within 2%. Must correct the background measurement of HCL for the dilution caused by the addition of the spike gas standard
- Collect two unspiked HCL measurements (AVG is your pre-spike background); introduce spike upstream of the PM filter and as close to the sampling inlet as practical; maintain the spike for at least two times the DS response time or until consecutive measurements agree within 5%.
- Repeat process at each spike concentration and take one final set of unspiked sample measurements.

Relative Accuracy Test

- Use Method 26A , Method 320, or Method 321
- 26A- Sample sufficient gas to reach three times your method detection limit, or a minimum of 1-hour, whichever is greater
- 320 or 321- collect gas samples at stack conditions (hot and wet) and transverse per 11.9.3
- Conduct dilutent, moisture (both if needed), and pollutant measurements simultaneously. Measurement location must be at least two diameters (2D)downstream from the control device (CD) or point of generation, and at least 1/2 D upstream from the effluent or CD

Relative Accuracy Test (con't)

- Conduct dilutent, moisture (both if needed), and pollutant measurements simultaneously. Measurement location must be at least two diameters (2D)downstream from the control device (CD) or point of generation, and at least 1/2 D upstream from the effluent or CD
- Calc the mean measured concentration for all sampling ports, and percent stratification (equation 8) of each transverse point.
- Conduct all RM tests within 3 cm of the transverse points. Record the beginning and end of each RM run in hours, minutes, and seconds using a clock synchronized with the CEMS clock
- Conduct a minimum of nine RM test runs. Span is calculated using the HCL NSPS emission standard of 3.0 ppmvd, doubling that and rounding up to the nearest multiple of 5.0.

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