Environmental Protection Agency

§ 91.325 Analyzer interference checks.

(a) Gases present in the exhaust other than the one being analyzed can interfere with the reading in several ways. Positive interference occurs in NDIR and PMD instruments when the interfering gas gives the same effect as the gas being measured, but to a lesser degree. Negative interference occurs in NDIR instruments by the interfering gas broadening the absorption band of the measured gas, and in CLD instruments by the interfering gas quenching the radiation. The interference checks described in this section are to be made initially and after any major repairs that could affect analyzer performance.

(b) CO analyzer water and CO$_2$ interference checks. Bubble through water at room temperature a CO$_2$ span gas having a concentration of between 80 percent and 100 percent inclusive of full scale of the maximum operating range used during testing through the CO$_2$ NDIR analyzer and record the value as “a.”

(ii) Dilute the CO$_2$ span gas approximately 50 percent with NO span gas and pass through the CO$_2$ NDIR and CLD (or HCLD). Record the CO$_2$ and NO values as “b” and “c,” respectively.

(iii) Shut off the CO$_2$ and pass only the NO span gas through the CLD (or HCLD). Record the NO value recorded as “d.”

(iv) Calculate the percent CO$_2$ quench as follows, which may not exceed three percent:

\[
\text{percent CO}_2\text{ quench} = \frac{100 - 100 \times \frac{c \times a}{(d \times a - d \times b)}}{a/b} \times \frac{a}{b}
\]

Where:

- $a$ = Undiluted CO$_2$ concentration (percent)
- $b$ = Diluted CO$_2$ concentration (percent)
- $c$ = Diluted NO concentration (ppm)
- $d$ = Undiluted NO concentration (ppm)

(2) NO$_x$ analyzer water quench check.

(i) This check applies to wet measurements only. Pass an NO span gas having a concentration of 80 percent to 100 percent of full scale of a normal operating range through the CLD (or HCLD). Record the response as “D.” Bubble through water at room temperature the NO span gas and pass it through the CLD (or HCLD). Record the analyzers response as “AR.” Determine and record the analyzers absolute operating pressure and the bubbler water temperature. (It is important that the NO span gas contains minimal NO$_2$ concentration for this check. No allowance for absorption of NO$_2$ in water has been made in the following quench calculations.)

(ii) Calculations for water quench must consider dilution of the NO span gas with water vapor and scaling of the water vapor concentration of the mixture to that expected during testing. Determine the mixture’s saturated vapor pressure (designated as “Pwb”) that corresponds to the bubbler water temperature. Calculate the water concentration (“ZI”, percent) in the mixture by the following equation:

\[
ZI = 100 \times \frac{\text{Pwb}}{\text{GP}}
\]

Where:

- Pwb = Bubbler water pressure
- GP = Gas pressure
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GP = the analyzer’s standard operating pressure (pascals)

(iii) Calculate the expected dilute NO span gas and water vapor mixture concentration (designated as “D1”) by the following equation:

\[ D1 = D \times (1 - Z1/100) \]

(iv)(A) The maximum raw or dilute exhaust water vapor concentration expected during testing (designated as Wm) can be estimated from the CO₂ span gas (or as defined in the equation in this paragraph and designated as A) criteria in paragraph (c)(1) of this section and the assumption of a fuel atom H/C ratio of 1.8:1 as:

\[ Wm(\%) = 0.9 \times A(\%) \]

Where:

A = maximum CO₂ concentration expected in the sample system during testing.

(B) Percent water quench shall not exceed 3 percent and shall be calculated by:

\[ \% \text{ Water Quench} = 100 \times (D1 - AR)D1 \times Wm/Z1 \]


§ 91.327 Sampling system requirements.

(a) Sample component surface temperature. For sampling systems which use heated components, use engineering judgment to locate the coolest portion of each component (pump, sample line section, filters, and so forth) in the heated portion of the sampling system that has a separate source of power or heating element. Monitor the temperature at that location. If several components are within an oven, then only the surface temperature of the component with the largest thermal mass and the oven temperature need be measured.

(b) If water is removed by condensation, monitor the sample gas temperature or sample dew point either within the water trap or downstream. It may not exceed 7 °C.

§ 91.328 Measurement equipment accuracy/calibration frequency table.

(a) The accuracy of measurements must be such that the maximum tolerances shown in Table 2 in appendix A to this subpart are not exceeded.

(b) Calibrate all equipment and analyzers according to the frequencies shown in Table 2 in appendix A to this subpart.

(c) Prior to initial use and after major repairs, bench check each analyzer (see §91.323).

(d) Calibrate as specified in §91.306 and §§91.315 through 91.322.

(e) At least monthly, or after any maintenance which could alter calibration, perform the following calibrations and checks.

(1) Leak check the vacuum side of the system (see §91.324(a)).

(2) Verify that the automatic data collection system (if used) meets the requirements found in Table 2 in appendix A to this subpart.

(3) Check the fuel flow measurement instrument to insure that the specifications in Table 2 in appendix A to this subpart are met.