

§ 1065.355

40 CFR Ch. I (7-1-08 Edition)

(d) *Procedure.* Perform the interference verification as follows:

(1) Start, operate, zero, and span the CO₂ NDIR analyzer as you would before an emission test.

(2) Create a humidified test gas by bubbling zero air that meets the specifications in §1065.750 through distilled water in a sealed vessel. If the sample is not passed through a dryer, control the vessel temperature to generate an H₂O level at least as high as the maximum expected during testing. If the sample is passed through a dryer during testing, control the vessel temperature to generate an H₂O level at least as high as the level determined in §1065.145(d)(2).

(3) Introduce the humidified test gas into the sample system. You may introduce it downstream of any sample dryer, if one is used during testing.

(4) Measure the humidified test gas dewpoint, T_{dew} , and pressure, p_{total} , as close as possible to the inlet of the analyzer.

(5) Downstream of the vessel, maintain the humidified test gas temperature at least 5 °C above its dewpoint.

(6) Allow time for the analyzer response to stabilize. Stabilization time may include time to purge the transfer line and to account for analyzer response.

(7) While the analyzer measures the sample's concentration, record 30 seconds of sampled data. Calculate the arithmetic mean of this data. The analyzer meets the interference verification if this value is within (0 ±0.4) mmol/mol.

§ 1065.355 H₂O and CO₂ interference verification for CO NDIR analyzers.

(a) *Scope and frequency.* If you measure CO using an NDIR analyzer, verify the amount of H₂O and CO₂ interference after initial analyzer installation and after major maintenance.

(b) *Measurement principles.* H₂O and CO₂ can positively interfere with an NDIR analyzer by causing a response similar to CO. If the NDIR analyzer uses compensation algorithms that utilize measurements of other gases to meet this interference verification, simultaneously conduct these other measurements to test the compensation algorithms during the analyzer interference verification.

(c) *System requirements.* A CO NDIR analyzer must have combined H₂O and CO₂ interference that is within ±2 % of the flow-weighted mean concentration of CO expected at the standard, though we strongly recommend a lower interference that is within ±1%.

(d) *Procedure.* Perform the interference verification as follows:

(1) Start, operate, zero, and span the CO NDIR analyzer as you would before an emission test.

(2) Create a water-saturated CO₂ test gas by bubbling a CO₂ span gas through distilled water in a sealed vessel at (25 ±10) °C.

(3) Introduce the water-saturated CO₂ test gas upstream of any sample dryer, if one is used during testing.

(4) Allow time for the analyzer response to stabilize. Stabilization time may include time to purge the transfer line and to account for analyzer response.

(5) While the analyzer measures the sample's concentration, record its output for 30 seconds. Calculate the arithmetic mean of this data.

(6) Multiply this mean value by the ratio of expected CO₂ to span gas CO₂ concentration. In other words, estimate the flow-weighted mean dry concentration of CO₂ expected during testing, and then divide this value by the concentration of CO₂ in the span gas used for this verification. Then multiply this ratio by the mean value recorded during this verification.

(7) The analyzer meets the interference verification if the result of paragraph (d)(6) of this section is within ±2 % of the flow-weighted mean concentration of CO expected at the standard.

(e) *Exceptions.* The following exceptions apply:

(1) You may omit this verification if you can show by engineering analysis that for your CO sampling system and your emission calculations procedures, the combined CO₂ and H₂O interference for your CO NDIR analyzer always affects your brake-specific CO emission results within ±0.5 % of the applicable CO standard.

(2) You may use a CO NDIR analyzer that you determine does not meet this verification, as long as you try to correct the problem and the measurement deficiency does not adversely affect your ability to show that engines comply with all applicable emission standards.

EFFECTIVE DATE NOTE: At 73 FR 37308, June 30, 2008, §1065.355 was amended by revising paragraph (d), effective July 7, 2008. For the

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convenience of the user, the revised text is set forth as follows:

§ 1065.355 H₂O and CO₂ interference verification for CO NDIR analyzers.

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(d) *Procedure.* Perform the interference verification as follows:

(1) Start, operate, zero, and span the CO NDIR analyzer as you would before an emission test.

(2) Create a humidified CO₂ test gas by bubbling a CO₂ span gas through distilled water in a sealed vessel. If the sample is not passed through a dryer, control the vessel temperature to generate an H₂O level at least as high as the maximum expected during testing. If the sample is passed through a dryer during testing, control the vessel temperature to generate an H₂O level at least as high as the level determined in §1065.145(d)(2). Use a CO₂ span gas concentration at least as high as the maximum expected during testing.

(3) Introduce the humidified CO₂ test gas into the sample system. You may introduce it downstream of any sample dryer, if one is used during testing.

(4) Measure the humidified CO₂ test gas dewpoint, T_{dew} , and pressure, p_{total} , as close as possible to the inlet of the analyzer.

(5) Downstream of the vessel, maintain the humidified gas temperature at least 5 °C above its dewpoint.

(6) Allow time for the analyzer response to stabilize. Stabilization time may include time to purge the transfer line and to account for analyzer response.

(7) While the analyzer measures the sample's concentration, record its output for 30 seconds. Calculate the arithmetic mean of this data.

(8) The analyzer meets the interference verification if the result of paragraph (d)(7) of this section meets the tolerance in paragraph (c) of this section.

(9) You may also run interference procedures for CO₂ and H₂O separately. If the CO₂ and H₂O levels used are higher than the maximum levels expected during testing, you may scale down each observed interference value by multiplying the observed interference by the ratio of the maximum expected concentration value to the actual value used during this procedure. You may run the separate interference procedures concentrations of H₂O (down to 0.025 mol/mol H₂O content) that are lower than the maximum levels expected during testing, but you must scale up the observed H₂O interference by multiplying the observed interference by the ratio of the maximum expected H₂O concentration value to the actual value used during this procedure. The sum of the two

scaled interference values must meet the tolerance in paragraph (c) of this section.

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HYDROCARBON MEASUREMENTS

§ 1065.360 FID optimization and verification.

(a) *Scope and frequency.* For all FID analyzers perform the following steps:

(1) Calibrate a FID upon initial installation. Repeat the calibration as needed using good engineering judgment.

(2) Optimize a FID's response to various hydrocarbons after initial analyzer installation and after major maintenance.

(3) Determine a FID's methane (CH₄) response factor after initial analyzer installation and after major maintenance.

(4) Verify methane (CH₄) response within 185 days before testing.

(b) *Calibration.* Use good engineering judgment to develop a calibration procedure, such as one based on the FID-analyzer manufacturer's instructions and recommended frequency for calibrating the FID. Alternately, you may remove system components for off-site calibration. Calibrate using C₃H₈ calibration gases that meet the specifications of §1065.750. We recommend FID analyzer zero and span gases that contain approximately the flow-weighted mean concentration of O₂ expected during testing. If you use a FID to measure methane (CH₄) downstream of a nonmethane cutter, you may calibrate that FID using CH₄ calibration gases with the cutter. Regardless of the calibration gas composition, calibrate on a carbon number basis of one (C₁). For example, if you use a C₃H₈ span gas of concentration 200 μmol/mol, span the FID to respond with a value of 600 μmol/mol.

(c) *FID response optimization.* Use good engineering judgment for initial instrument start-up and basic operating adjustment using FID fuel and zero air. Heated FIDs must be within their required operating temperature ranges. Optimize FID response at the most common analyzer range expected during emission testing. Optimization involves adjusting flows and pressures