

flow-weighted dilute samples of the applicable alcohols and carbonyls at a constant flow rate. You may not use raw sampling for alcohols and carbonyls.

(b) You may collect background samples for correcting dilution air for background concentrations of alcohols and carbonyls.

(c) Maintain sample temperatures within the dilution tunnel, probes, and sample lines less than 121 °C but high enough to prevent aqueous condensation up to the point where a sample is collected. The maximum temperature limit is intended to prevent chemical reaction of the alcohols and carbonyls. The lower temperature limit is intended to prevent loss of the alcohols and carbonyls by dissolution in condensed water. Use good engineering judgment to minimize the amount of time that the undiluted exhaust is outside this temperature range to the extent practical. We recommend that you minimize the length of exhaust tubing before dilution. Extended lengths of exhaust tubing may require preheating, insulation, and cooling fans to limit excursions outside this temperature range.

(d) You may bubble a sample of the exhaust through water to collect alcohols for later analysis. You may also use a photo-acoustic analyzer to quantify ethanol and methanol in an exhaust sample.

(e) Sample the exhaust through cartridges impregnated with 2,4-dinitrophenylhydrazine to collect carbonyls for later analysis. If the standard-setting part specifies a duty cycle that has multiple test intervals (such as multiple engine starts or an engine-off soak phase), you may proportionally collect a single carbonyl sample for the entire duty cycle. For example, if the standard-setting part specifies a six-to-one weighting of hot-start to cold-start emissions, you may collect a single carbonyl sample for the entire duty cycle by using a hot-start sample flow rate that is six times the cold-start sample flow rate.

(f) You may sample alcohols or carbonyls using "California Non-Methane Organic Gas Test Procedures" (incorporated by reference in §1065.1010). If you use this method, follow its cal-

culations to determine the mass of the alcohol/carbonyl in the exhaust sample, but follow subpart G of this part for all other calculations.

(g) Use good engineering judgment to sample other oxygenated hydrocarbon compounds in the exhaust.

§ 1065.845 Response factor determination.

Since FID analyzers generally have an incomplete response to alcohols and carbonyls, determine each FID analyzer's alcohol/carbonyl response factor (such as RF_{MeOH}) after FID optimization. Formaldehyde response is assumed to be zero and does not need to be determined. Use the most recent alcohol/carbonyl response factors to compensate for alcohol/carbonyl response.

(a) Determine the alcohol/carbonyl response factors as follows:

(1) Select a C_3H_8 span gas that meets the specifications of §1065.750. Note that FID zero and span balance gases may be any combination of purified air or purified nitrogen that meets the specifications of §1065.750. We recommend FID analyzer zero and span gases that contain approximately the flow-weighted mean concentration of O_2 expected during testing. Record the C_3H_8 concentration of the gas.

(2) Select or prepare an alcohol/carbonyl calibration gas that meets the specifications of §1065.750 and has a concentration typical of the peak concentration expected at the hydrocarbon standard. Record the calibration concentration of the gas.

(3) Start and operate the FID analyzer according to the manufacturer's instructions.

(4) Confirm that the FID analyzer has been calibrated using C_3H_8 . Calibrate on a carbon number basis of one (C_1). For example, if you use a C_3H_8 span gas of concentration 200 $\mu\text{mol/mol}$, span the FID to respond with a value of 600 $\mu\text{mol/mol}$.

(5) Zero the FID. Note that FID zero and span balance gases may be any combination of purified air or purified nitrogen that meets the specifications of §1065.750. We recommend FID analyzer zero and span gases that contain approximately the flow-weighted mean concentration of O_2 expected during testing.

(6) Span the FID with the C₃H₈ span gas that you selected under paragraph (a)(1) of this section.

(7) Introduce at the inlet of the FID analyzer the alcohol/carbonyl calibration gas that you selected under paragraph (a)(2) of this section.

(8) Allow time for the analyzer response to stabilize. Stabilization time may include time to purge the analyzer and to account for its response.

(9) While the analyzer measures the alcohol/carbonyl concentration, record 30 seconds of sampled data. Calculate the arithmetic mean of these values.

(10) Divide the mean measured concentration by the recorded span concentration of the alcohol/carbonyl calibration gas. The result is the FID analyzer's response factor for alcohol/carbonyl, RF_{MeOH} .

(b) Alcohol/carbonyl calibration gases must remain within $\pm 2\%$ of the labeled concentration. You must demonstrate the stability based on a quarterly measurement procedure with a precision of $\pm 2\%$ percent or another method that we approve. Your measurement procedure may incorporate multiple measurements. If the true concentration of the gas changes deviates by more than $\pm 2\%$, but less than $\pm 10\%$, the gas may be relabeled with the new concentration.

§ 1065.850 Calculations.

Use the calculations specified in § 1065.665 to determine THCE or NMHCE.

Subpart J—Field Testing and Portable Emission Measurement Systems

§ 1065.901 Applicability.

(a) *Field testing.* This subpart specifies procedures for field-testing engines to determine brake-specific emissions using portable emission measurement systems (PEMS). These procedures are designed primarily for in-field measurements of engines that remain installed in vehicles or equipment in the field. Field-test procedures apply to your engines only as specified in the standard-setting part.

(b) *Laboratory testing.* You may optionally use PEMS for any laboratory testing, as long as the standard-setting

part does not prohibit it for certain types of laboratory testing, subject to the following provisions:

(1) Follow the laboratory test procedures specified in this part 1065, according to § 1065.905(e).

(2) Do not apply any PEMS-related field-testing adjustments or "measurement allowances" to laboratory emission results or standards.

(3) Do not use PEMS for laboratory measurements if it prevents you from demonstrating compliance with the applicable standards. Some of the PEMS requirements in this part 1065 are less stringent than the corresponding laboratory requirements. Depending on actual PEMS performance, you might therefore need to account for some additional measurement uncertainty when using PEMS for laboratory testing. If we ask, you must show us by engineering analysis that any additional measurement uncertainty due to your use of PEMS for laboratory testing is offset by the extent to which your engine's emissions are below the applicable standards. For example, you might show that PEMS versus laboratory uncertainty represents 5% of the standard, but your engine's deteriorated emissions are at least 20% below the standard for each pollutant.

§ 1065.905 General provisions.

(a) *General.* Unless the standard-setting part specifies deviations from the provisions of this subpart, field testing and laboratory testing with PEMS must conform to the provisions of this subpart.

(b) *Field-testing scope.* Field testing conducted under this subpart may include any normal in-use operation of an engine.

(c) *Field testing and the standard-setting part.* This subpart J specifies procedures for field-testing various categories of engines. See the standard-setting part for specific provisions for a particular type of engine. Before using this subpart's procedures for field testing, read the standard-setting part to answer at least the following questions:

(1) How many engines must I test in the field?

(2) How many times must I repeat a field test on an individual engine?