

§ 1065.750 Analytical gases.

Analytical gases must meet the accuracy and purity specifications of this section, unless you can show that other specifications would not affect your ability to show that your engines comply with all applicable emission standards.

(a) Subparts C, D, F, and J of this part refer to the following gas specifications:

(1) Use purified gases to zero measurement instruments and to blend with calibration gases. Use gases with con-

tamination no higher than the highest of the following values in the gas cylinder or at the outlet of a zero-gas generator:

(i) 2% contamination, measured relative to the flow-weighted mean concentration expected at the standard. For example, if you would expect a flow-weighted CO concentration of 100.0 mmol/mol, then you would be allowed to use a zero gas with CO contamination less than or equal to 2.000 mmol/mol.

(ii) Contamination as specified in the following table:

TABLE 1 OF § 1065.750—GENERAL SPECIFICATIONS FOR PURIFIED GASES

Constituent	Purified air ¹	Purified N ₂ ¹
THC (C ₁ equivalent)	<0.05 µmol/mol	< 0.05 µmol/mol
CO	<1 µmol/mol	< 1 µmol/mol
CO ₂	< 10 µmol/mol	< 10 µmol/mol
O ₂	0.205 to 0.215 mol/mol	< 2 µmol/mol
NO _x	< 0.02 µmol/mol	< 0.02 µmol/mol

¹We do not require these levels of purity to be NIST-traceable.

(2) Use the following gases with a FID analyzer:

(i) *FID fuel*. Use FID fuel with an H₂ concentration of (0.400 ±0.004) mol/mol, balance He. Make sure the mixture contains no more than 0.05 µmol/mol THC.

(ii) *FID burner air*. Use FID burner air that meets the specifications of purified air in paragraph (a)(1) of this section. For field testing, you may use ambient air.

(iii) *FID zero gas*. Zero flame-ionization detectors with purified gas that meets the specifications in paragraph (a)(1) of this section, except that the purified gas O₂ concentration may be any value. Note that FID zero balance gases may be any combination of purified air and purified nitrogen. We recommend FID analyzer zero gases that contain approximately the flow-weighted mean concentration of O₂ expected during testing.

(iv) *FID propane span gas*. Span and calibrate THC FID with span concentrations of propane, C₃H₈. Calibrate on a carbon number basis of one (C₁). For example, if you use a C₃H₈ span gas of concentration 200 µmol/mol, span a FID to respond with a value of 600 µmol/mol. Note that FID span balance gases may be any combination of puri-

fied air and purified nitrogen. We recommend FID analyzer span gases that contain approximately the flow-weighted mean concentration of O₂ expected during testing.

(v) *FID methane span gas*. If you always span and calibrate a CH₄ FID with a nonmethane cutter, then span and calibrate the FID with span concentrations of methane, CH₄. Calibrate on a carbon number basis of one (C₁). For example, if you use a CH₄ span gas of concentration 200 µmol/mol, span a FID to respond with a value of 200 µmol/mol. Note that FID span balance gases may be any combination of purified air and purified nitrogen. We recommend FID analyzer span gases that contain approximately the flow-weighted mean concentration of O₂ expected during testing.

(3) Use the following gas mixtures, with gases traceable within ±1.0% of the NIST true value or other gas standards we approve:

- (i) CH₄, balance purified synthetic air and/or N₂ (as applicable).
- (ii) C₂H₆, balance purified synthetic air and/or N₂ (as applicable).
- (iii) C₃H₈, balance purified synthetic air and/or N₂ (as applicable).
- (iv) CO, balance purified N₂.
- (v) CO₂, balance purified N₂.

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- (vi) NO, balance purified N₂.
- (vii) NO₂, balance purified N₂.
- (viii) O₂, balance purified N₂.
- (ix) C₃H₈, CO, CO₂, NO, balance purified N₂.
- (x) C₃H₈, CH₄, CO, CO₂, NO, balance purified N₂.

(4) You may use gases for species other than those listed in paragraph (a)(3) of this section (such as methanol in air, which you may use to determine response factors), as long as they are traceable to within ±1.0 % of the NIST true value or other similar standards we approve, and meet the stability requirements of paragraph (b) of this section.

(5) You may generate your own calibration gases using a precision blending device, such as a gas divider, to dilute gases with purified N₂ or purified synthetic air. If your gas dividers meet the specifications in §1065.248, and the gases being blended meet the requirements of paragraphs (a)(1) and (3) of this section, the resulting blends are considered to meet the requirements of this paragraph (a).

(b) Record the concentration of any calibration gas standard and its expiration date specified by the gas supplier.

(1) Do not use any calibration gas standard after its expiration date, except as allowed by paragraph (b)(2) of this section.

(2) Calibration gases may be relabeled and used after their expiration date as follows:

(i) Alcohol/carbonyl calibration gases used to determine response factors according to subpart I of this part may be relabeled as specified in subpart I of this part.

(ii) Other gases may be relabeled and used after the expiration date only if we approve it in advance.

(c) Transfer gases from their source to analyzers using components that are dedicated to controlling and transferring only those gases. For example, do not use a regulator, valve, or transfer line for zero gas if those components were previously used to transfer a different gas mixture. We recommend that you label regulators, valves, and transfer lines to prevent contamination. Note that even small traces of a gas mixture in the dead volume of a regulator, valve, or transfer line can

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diffuse upstream into a high-pressure volume of gas, which would contaminate the entire high-pressure gas source, such as a compressed-gas cylinder.

(d) To maintain stability and purity of gas standards, use good engineering judgment and follow the gas standard supplier's recommendations for storing and handling zero, span, and calibration gases. For example, it may be necessary to store bottles of condensable gases in a heated environment.

§ 1065.790 Mass standards.

(a) *PM balance calibration weights.* Use PM balance calibration weights that are certified as NIST-traceable within 0.1 % uncertainty. Calibration weights may be certified by any calibration lab that maintains NIST-traceability. Make sure your lowest calibration weight has no greater than ten times the mass of an unused PM-sample medium.

(b) *Dynamometer calibration weights.*
[Reserved]

Subpart I—Testing With Oxygenated Fuels

§ 1065.801 Applicability.

(a) This subpart applies for testing with oxygenated fuels. Unless the standard-setting part specifies otherwise, the requirements of this subpart do not apply for fuels that contain less than 25% oxygenated compounds by volume. For example, you generally do not need to follow the requirements of this subpart for tests performed using a fuel containing 10% ethanol and 90% gasoline, but you must follow these requirements for tests performed using a fuel containing 85% ethanol and 15% gasoline.

(b) Section 1065.805 applies for all other testing that requires measurement of any alcohols or carbonyls.

(c) This subpart specifies sampling procedures and calculations that are different than those used for non-oxygenated fuels. All other test procedures of this part 1065 apply for testing with oxygenated fuels.

§ 1065.805 Sampling system.

(a) Proportionally dilute engine exhaust, and use batch sampling collect