

(4) The flow capacity of the CVS shall be large enough to completely eliminate water condensation in the dilution and sampling systems. (300 to 350 cfm (0.142 to 0.165 m³/s) is sufficient for most petroleum-fueled vehicles. Higher flow rates are required for methanol-fueled vehicles and may be required for natural gas-fueled and liquefied petroleum gas-fueled vehicles.

Procedures for determining CVS flow rates are detailed in "Calculation of Emissions and Fuel Economy When Using Alternative Fuels," EPA 460/3-83-009.) Dehumidifying the dilution air before entering the CVS is allowed. Heating the dilution air is also allowed, provided:

(i) The air (or air plus exhaust gas) temperature does not exceed 250°F (121°C).

(ii) Calculation of the CVS flow rate necessary to prevent water condensation is based on the lowest temperature encountered in the CVS prior to sampling. (It is recommended that the CVS system be insulated when heated dilution air is used.)

(iii) The dilution ratio is sufficiently high to prevent condensation in bag samples as they cool to room temperature.

(5) Sample collection bags for dilution air and exhaust samples shall be of sufficient size so as not to impede sample flow. A single dilution air sample, covering the total test period, may be collected for the determination of methanol and formaldehyde background (methanol-fueled vehicles).

(6) The methanol sample collection system and the formaldehyde sample collection system shall each be of sufficient capacity so as to collect samples of adequate size for analysis without significant impact on the volume of dilute exhaust passing through the CVS. The systems shall also comply with the following requirements that apply to the design of the systems, not to individual tests.

(i) The methanol system shall be designed such that, if a test vehicle emitted the maximum allowable level of methanol (based on all applicable standards) during the first phase of the test, the measured concentration in the primary impinger would exceed either 25 mg/l or a concentration equal to 25 times the limit of detection for the GC analyzer. Sampling systems for all phases shall be identical.

(ii) The formaldehyde system shall be designed such that, if a test vehicle emitted formaldehyde at a rate equal to twenty percent of the maximum allowable level of NMHCE (i.e., 0.05 g/mi for a 0.25 g/mi NMHCE standard), or the maximum formaldehyde level

allowed by a specific formaldehyde standard, whichever is less, during the first phase of the test, the concentration of formaldehyde in the DNPH solution of the primary impinger, or solution resulting from the extraction of the DNPH cartridge, shall exceed either 2.5 mg/l or a concentration equal to 25 times the limit of detection for the HPLC analyzer. Sampling systems for all phases shall be identical.

(iii) The methanol and formaldehyde systems shall be designed such that the primary impinger collects at least 90 percent of the analyte in the samples. The remaining analyte shall be collected by the secondary impinger. This requirement does not apply to dilution air samples, since they do not require secondary impingers, or to samples in which the concentrations approach the limit of detection.

(d) *Component description, CFV-EFC-CVS.* The CVS sample system is identical to the system described in paragraph (c) of this section, plus includes a means of electronically measuring the CVS flow rate, and electronic mass flow controllers for the methanol and formaldehyde sample lines. The EFC sample system shall conform to all of the requirements listed in paragraph (c), except that the methanol and formaldehyde samples must both be drawn from a static probe. It also must comply with the following additional requirements:

(1) The ratio of the CVS mass flow rate to the sample mass flow rate shall not deviate from the design ratio by more than ± 5 percent. (The volumetric sample flow rate shall be varied inversely with the square root of the bulk stream temperature.)

(2) Flow meters to totalize sample volumes for methanol and/or formaldehyde samples shall meet the accuracy specifications of § 86.120. Total sample volumes may be obtained from the flow controllers, provided that the controllers meet the accuracy specifications of § 86.120.

15. Section 86.110-94 of Subpart B is amended by revising the text of paragraph (a)(1) preceding the figures, paragraphs (a)(5)(i) through (a)(5)(iii), (b) introductory text, (b)(1), (b)(2), (c), and (d), to read as follows:

§ 86.110-94 Exhaust gas sampling system; diesel-cycle vehicles, and Otto-cycle vehicles requiring particulate emissions measurements.

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(a) * * *

(1) This sampling system requires the use of a PDP-CVS, CFV-CVS (or a CFV-EFC-CVS), sample system with heat exchanger connected to a dilution

tunnel. The heat exchanger is not required for the CFV-CVS or EFC-CFV-CVS if electronic flow controllers are used to maintain proportionality for the particulate sample. Figure B94-5 is a schematic drawing of the PDP system. Figure B94-6 is a schematic drawing of the CFV-CVS system. (Methanol-fueled Otto-cycle vehicles may be tested using this test equipment, without measuring particulate emissions.)

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(i) A tailpipe to dilution tunnel duct of unrestricted length maintained at a temperature above the dew point of the mixture, but below 250°F (121°C) through heating and cooling as required; or

(ii) Using a short duct (up to 12 feet long) constructed of smooth wall pipe with a minimum of flexible sections maintained at a temperature above the dew point of the mixture, but below 250°F (121°C) prior to the test and during breaks in testing (insulation may remain in place and or heating may occur during the testing provided the maximum temperature is not exceeded); or

(iii) Using smooth wall duct less than five feet long with no required heating. A maximum of two short flexible connectors are allowed under this option; or

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(b) *Component description—petroleum-fueled, natural gas-fueled and liquefied petroleum gas-fueled vehicles.* The components necessary for petroleum-fueled, natural gas-fueled and liquefied petroleum gas-fueled vehicle exhaust sampling shall meet the following requirements:

(1) The PDP-CVS, Figure B94-5, shall contain a proportional particulate sampling system, and shall conform to all of the requirements listed for the exhaust gas PDP-CVS (§ 86.109(b)), with one exception: a flow rate of sufficient volume is required to maintain the diluted exhaust stream, from which the particulate sample flow is taken, at a temperature of 125°F (52°C) or less.

(2) The CFV sample system, Figure B94-6, shall contain a proportional particulate sampling system, and shall conform to all of the requirements listed for the exhaust gas CFV sample system (§ 86.109(c)), except for the following:

(i) A flow rate of sufficient volume is required to maintain the diluted exhaust stream, from which the particulate sample flow is taken, at a temperature of 125°F (52°C) or less.

(ii) If a constant volume particulate sample is collected, a heat exchanger is required.