

§ 86.1311-94 Exhaust gas analytical system; CVS bag sample.

(a) *Schematic drawings.* Figure N94-1 is a schematic drawing of the exhaust gas analytical system used for analyzing CVS bag samples from either Otto-cycle or diesel engines. Since various configurations can produce accurate results, exact conformance with the drawing is not required. Additional components such as instruments, valves, solenoids, pumps and switches may be used to provide additional information and coordinate the functions of the component systems. Other components such as snubbers, which are not needed to maintain accuracy in some systems, may be excluded if their exclusion is based upon good engineering judgment.

(b) *Major component description.* The analytical system, Figure N94-1, consists of a flame ionization detector (FID) (heated for methanol-fueled (235 ±15 °F (113 ±8 °C)) and for petroleum-fueled diesel (375 ±10 °F (191 ±6 °C) engines) for the measurement of hydrocarbons, a methane analyzer (consisting of a gas chromatograph combined with a FID) for the determination of CH₄ (for engines subject to NMHC standards, where applicable), nondispersive infrared analyzers (NDIR) for the measurement of carbon monoxide and carbon dioxide, and a chemiluminescence analyzer (CL) for the measurement of oxides of nitrogen. The analytical system for methanol consists of a gas chromatograph (GC), equipped with a flame ionization detector. The analysis for formaldehyde is performed using high pressure liquid chromatography (HPLC) of 2,4-dinitrophenylhydrazine (DNPH) derivatives using ultraviolet (UV) detection. The exhaust gas analytical system shall conform to the following requirements:

(1) The CL requires that the nitrogen dioxide present in the sample be converted to nitric oxide before analysis. Other types of analyzers may be used if shown to yield equivalent results and if approved in advance by the Administrator.

(2) The carbon monoxide (NDIR) analyzer may require a sample conditioning column containing CaSO₄ or desiccating silica gel to remove water vapor, and containing ascarite to re-

move carbon dioxide from the CO analysis stream.

(i) If CO instruments are used which are essentially free of CO₂ and water vapor interference, the use of the conditioning column may be deleted (see §§ 86.1322 and 86.1342).

(ii) A CO instrument will be considered to be essentially free of CO₂ and water vapor interference if its response to a mixture of three percent CO₂ in N₂, which has been bubbled through water at room temperature, produces an equivalent CO response, as measured on the most sensitive CO range, which is less than one percent of full scale CO concentration on ranges above 300 ppm full scale or less than 3 ppm on ranges below 300 ppm full scale (see § 86.1322).

(3)(i) Using a methane analyzer consisting of a gas chromatograph combined with a FID, the measurement of methane shall be done in accordance with SAE Recommended Practice J1151, "Methane Measurement Using Gas Chromatography." (Incorporated by reference pursuant to § 86.1(b)(2).)

(ii) For natural gas vehicles, the manufacturer has the option of using gas chromatography to measure NMHC through direct quantitation of individual hydrocarbon species. The manufacturer shall conform to standard industry practices and use good engineering judgement.

(c) *Alternate analytical systems.* Analysis systems meeting the specifications of subpart D of this part may be used for testing required under this subpart, with the exception of §§ 86.346 and 86.347, provided that the systems in subpart D of this part meet the specifications of this subpart. Heated analyzers may be used in their heated configuration.

(d) *Other analyzers and equipment.* Other types of analyzers and equipment may be used if shown to yield equivalent results and if approved in advance by the Administrator.

[59 FR 48525, Sept. 21, 1994, as amended at 59 FR 50073, Sept. 30, 1994; 61 FR 127, Jan. 3, 1996; 62 FR 54730, Oct. 21, 1997]

§ 86.1312-88 Weighing chamber and microgram balance specifications.

(a) *Ambient conditions*—(1) *Temperature.* The ambient temperature of the

chamber (or room) in which the particulate filters are conditioned and weighed shall be maintained at 295 K \pm 3 K (22 °C \pm 3 °C) during all filter conditioning and weighing.

(2) *Humidity.* The humidity of the chamber (or room) in which the particulate filters are conditioned and weighed shall be maintained at a dew point temperature of 282.5 K \pm 3 K (9.4 °C \pm 3 °C) and a relative humidity of 45% \pm 8%. Either the dew point temperature or the relative humidity or both may be averaged over the preceding 10 minute period on a moving average basis.

(3) The chamber (or room) environment shall be free of any ambient contaminants (such as dust) that would settle on the particulate filters during their stabilization. It is required that at least two unused reference filter pairs remain in the weighing room at all times in covered (to reduce dust contamination) but unsealed (to permit humidity exchange) petri dishes. These reference filter pairs shall be placed in the same general area as the sample filters. These reference filter pairs shall be weighed within 4 hours of, but preferably at the same time as, the sample filter pair weighings.

(4) If the average weight of the reference filter pairs changes between sample filter weighings by more than 40 micrograms, then all sample filters and background filters in the process of stabilization shall be discarded and the emissions tests repeated.

(5) If the room (or chamber) environmental conditions are not met, then the filters shall remain in the conditioning room for at least one hour after correct conditions are met prior to weighing.

(6) The reference filter pairs shall be changed at least once a month, but never between clean and used weighings of a given sample filter pairs. More than one set of reference filter pair may be used. The reference filters shall be the same size and material as the sample filters.

(b) *Weighing balance specifications.* The microgram balance used to determine the weights of all filters shall have a precision (standard deviation) of

20 micrograms and readability of 10 micrograms.

(Secs. 202, 203, 206, 207, 208, 301a, Clean Air Act, as amended; 42 U.S.C. 7521, 7522, 7525, 7541, 7542, 7601a)

[50 FR 10702, Mar. 15, 1985, as amended at 52 FR 47871, Dec. 16, 1987; 62 FR 47124, Sept. 5, 1997]

§ 86.1312-2007 Filter stabilization and microbalance workstation environmental conditions, microbalance specifications, and particulate matter filter handling and weighing procedures.

(a) *Ambient conditions for filter stabilization and weighing—(1) Temperature and humidity.* (i) The filter stabilization environment shall be maintained at 22 °C \pm 3 °C and a dewpoint of 9.5 °C \pm 1 °C. Dewpoint shall be measured with an instrument that exhibits an accuracy of at least \pm 0.25 °C NIST traceable as stated by the instrument manufacturer. Temperature shall be measured with an instrument that exhibits an accuracy of at least \pm 0.2 °C or better.

(ii) The immediate microbalance workstation environment shall be maintained at 22 °C \pm 1 °C and a dewpoint of 9.5 °C \pm 1 °C. If the microbalance workstation environment freely circulates with the filter stabilization environment, and this entire environment meets 22 °C \pm 1 °C and a dewpoint of 9.5 °C \pm 1 °C, then there is no requirement to measure temperature and dewpoint at the microbalance separate from the filter stabilization location. Otherwise, temperature at the microbalance workstation shall be measured with an instrument that exhibits an accuracy of at least \pm 0.2 °C or better, and dewpoint shall be measured with an instrument that exhibits an accuracy of at least \pm 0.25 °C NIST traceable as stated by the instrument manufacturer.

(2) *Cleanliness.* (i) The microbalance and filter stabilization environments shall be free of ambient contaminants (such as dust or other aerosols) that could settle on the particulate filters. It is recommended that these environments be built to conform with the Class 1000 specification (or cleaner) as determined by Federal Standard 209D or 209E for clean room classification