§ 86.125–94 Methane analyzer calibration.

Prior to introduction into service and monthly thereafter, the methane analyzer shall be calibrated:

(a) Follow the manufacturer's instructions for instrument startup and operation. Adjust the analyzer to optimize performance.

(b) Zero the methane analyzer with zero-grade air.

(c) Calibrate on each normally used operating range with CH_4 in air with nominal concentrations of 15, 30, 45, 60, 75, and 90 percent of that range. Additional calibration points may be generated. For each range calibrated, if the deviation from a least-squares best-fit straight line is 2 percent or less of the value at each data point, concentration values may be calculated by use of a single calibration factor for that range. If the deviation exceeds 2 percent at any point, the best-fit non-linear equation which represents the data to within 2 percent of each test point shall be used to determine concentration.

[56 FR 25774, June 5, 1991]

§ 86.126–90 Calibration of other equipment.

Other test equipment used for testing shall be calibrated as often as required by the manufacturer or as necessary according to good practice. Specific equipment requiring calibration are the gas chromatograph and flame ionization detector used in measuring methanol and the high pressure liquid chromatograph (HPLC) and ultraviolet detector for measuring formaldehyde.

[54 FR 14527, Apr. 11, 1989]

§ 86.127–00 Test procedures; overview.

Applicability. The procedures described in this and subsequent sections are used to determine the conformity of vehicles with the standards set forth in subpart A or S of this part (as applicable) for light-duty vehicles and light-duty trucks. Except where noted, the procedures of paragraphs (a) through (b) of this section, § 86.127–96 (c) and (d), and the contents of §§ 86.135–94, 86.136–90, 86.137–96, 86.140–94, 86.142–90, and 86.144–94 are applicable for determining emission results for vehicle exhaust emission systems designed to comply with the FTP emission standards, or the FTP emission element required for determining compliance with composite SFTP standards. Paragraphs (f) and (g) of this section discuss the additional test elements of aggressive driving (US06) and air conditioning (SC03) that comprise the exhaust emission components of the SFTP. Section 86.127–96(e) discusses fuel spitback emissions and paragraphs (h) and (i) of this section are applicable to all vehicle emission test procedures. Section 86.127–00 includes text that specifies requirements that differ from § 86.127–96. Where a paragraph in § 86.127–96 is identical and applicable to § 86.127–00, this may be indicated by specifying the corresponding paragraph and the statement "[Reserved]. For guidance see § 86.127-96."

(a) The overall test consists of prescribed sequences of fueling, parking, and operating test conditions. Vehicles are tested for any or all of the following emissions:

(1) Gaseous exhaust THC, CO, NO_X, CO_2 (for petroleum-fueled and gaseous-fueled vehicles), plus CH_3OH and HCHO for methanol-fueled vehicles, plus CH_4 (for vehicles subject to the NMHC and NMHCE standards).

(2) Particulates.

(3) Evaporative HC (for gasoline-fueled, methanol-fueled and gaseous-fueled vehicles) and CH_3OH (for methanol-fueled vehicles). The evaporative testing portion of the procedure occurs after the exhaust emission test; however, exhaust emissions need not be sampled to complete a test for evaporative emissions.

(4) Fuel spitback (this test is not required for gaseous-fueled vehicles).

(b) The FTP Otto-cycle exhaust emission test is designed to determine gaseous THC, CO, CO_2, CH_4, NO_X, and particulate mass emissions from gasoline-fueled, methanol-fueled and gaseous-fueled Otto-cycle vehicles as well as methanol and formaldehyde from methanol-fueled Otto-cycle vehicles, while simulating an average trip in an urban area of 11 miles (18 kilometers). The test consists of engine start-ups and vehicle operation on a chassis dynamometer through a specified driving schedule (see paragraph (a), EPA Urban

Dynamometer Driving Schedule, of appendix I to this part). A proportional part of the diluted exhaust is collected continuously for subsequent analysis, using a constant volume (variable dilution) sampler or critical flow venturi sampler.

(c)–(e) [Reserved]. For guidance see § 86.127–96.

(f) The element of the SFTP for exhaust emissions related to aggressive driving (US06) is designed to determine gaseous THC, NMHC, CO, CO_2, CH_4, and NO_X emissions from gasoline-fueled or diesel-fueled vehicles (see § 86.158–00 Supplemental test procedures; overview, and § 86.159–00 Exhaust emission test procedures for US06 emissions). The test cycle simulates urban driving speeds and accelerations that are not represented by the FTP Urban Dynamometer Driving Schedule simulated trips discussed in paragraph (b) of this section. The test consists of vehicle operation on a chassis dynamometer through a specified driving cycle (see paragraph (g), US06 Dynamometer Driving Schedule, of appendix I to this part). A proportional part of the diluted exhaust is collected continuously for subsequent analysis, using a constant volume (variable dilution) sampler or critical flow venturi sampler.

(g)(1) The element of the SFTP related to the increased exhaust emissions caused by air conditioning operation (SC03) is designed to determine gaseous THC, NMHC, CO, CO_2, CH_4, and NO_X emissions from gasoline-fueled or diesel fueled vehicles related to air conditioning use (see § 86.158–00 Supplemental federal test procedures; overview and § 86.160–00 Exhaust emission test procedure for SC03 emissions). The test cycle simulates urban driving behavior with the air conditioner operating. The test consists of engine startups and vehicle operation on a chassis dynamometer through specified driving cycles (see paragraph (h), SC03 Dynamometer Driving Schedule, of appendix I to this part). A proportional part of the diluted exhaust is collected continuously for subsequent analysis, using a constant volume (variable dilution) sampler or critical flow venturi sampler. The testing sequence includes an approved preconditioning cycle, a 10 minute soak with the engine turned off, and the SC03 cycle with measured exhaust emissions.

(2) The SC03 air conditioning test is conducted with the air conditioner operating at specified settings and the ambient test conditions of:

(i) Air temperature of 95 °F;

(ii) 100 grains of water/pound of dry air (approximately 40 percent relative humidity);

(iii) Simulated solar heat intensity of 850 W/m^2 (see § 86.161–00(d)); and

(iv) air flow directed at the vehicle that will provide representative air conditioner system condenser cooling at all vehicle speeds (see § 86.161–00(e)).

(3) Manufacturers have the option of simulating air conditioning operation during testing at other ambient test conditions provided they can demonstrate that the vehicle tail pipe exhaust emissions are representative of the emissions that would result from the SC03 cycle test procedure and the ambient conditions of paragraph (g)(2) of this section. The Administrator has approved two optional air conditioning test simulation procedures AC1 and AC2 (see § 86.162–00) for only the model years of 2000 through 2002. If a manufacturer desires to conduct simulation SC03 testing for model year 2003 and beyond, the simulation test procedure must be approved in advance by the Administrator (see §§ 86.162–00 and 86.163–00).

(h) Except in cases of component malfunction or failure, all emission control systems installed on or incorporated in a new motor vehicle shall be functioning during all procedures in this subpart. Maintenance to correct component malfunction or failure shall be authorized in accordance with § 86.098–25 or § 86.1834–01 as applicable.

(i) Background concentrations are measured for all species for which emissions measurements are made. For exhaust testing, this requires sampling and analysis of the dilution air. For evaporative testing, this requires measuring initial concentrations. (When testing methanol-fueled vehicles, manufacturers may choose not to measure background concentrations of methanol and/or formaldehyde, and

then assume that the concentrations are zero during calculations.)

[61 FR 54891, Oct. 22, 1996, as amended at 64 FR 23921, May 4, 1999]

§ 86.127–90 Test procedures; overview.

The procedures described in this and subsequent sections are used to determine the conformity of vehicles with the standards set forth in subpart A for light-duty vehicles and light-duty trucks.

(a) The overall test consists of prescribed sequences of fueling, parking and operating conditions. Vehicles are tested for any or all of the following emissions:

(1) Gaseous exhaust HC, CO, NO_X, CO_2 (for petroleum-fueled vehicles), plus CH_3OH and HCHO for methanol-fueled vehicles (measurement of CH_3OH and HCHO may be omitted for 1990 through 1994 model year methanol-fueled vehicles provided a HFID calibrated on methanol is used for measuring HC plus CH_3OH).

(2) Particulates (diesel vehicles).

(3) Evaporative HC (for gasoline-fueled and methanol-fueled vehicles) and CH_3OH (for methanol-fueled vehicles). A separate CH_3OH measurement may be omitted for 1990 through 1994 model year methanol-fueled vehicles provided a HFID calibrated on methanol is used for measuring HC plus CH_3OH.

The evaporative portion of the test procedure occurs before and after the exhaust emission test, and in some cases, during the exhaust emission test.

(b) The Otto-cycle exhaust emission test is designed to determine gaseous hydrocarbon, carbon monoxide, carbon dioxide, and oxides of nitrogen mass emissions from gasoline-fueled and methanol-fueled vehicles as well as methanol and formaldehyde from methanol-fueled Otto-cycle vehicles while simulating an average trip in an urban area of 7.5 miles (12.1 kilometers). The test consists of engine startups and vehicle operation on a chassis dynamometer, through a specified driving schedule. A proportional part of the diluted exhaust is collected continuously for subsequent analysis, using a constant volume (variable dilution) sampler or critical flow venturi sampler.

(c) The diesel exhaust emission test is designed to determine particulate and gaseous mass emissions during a test similar to the test in §86.127(b). For petroleum-fueled vehicles, diluted exhaust is continuously analyzed for total hydrocarbons using a heated sample line and analyzer. The other gaseous emissions, CO, CO_2 and NO_X are collected continuously for analysis as in §86.127(b). For methanol-fueled vehicles, hydrocarbons, methanol, formaldehyde, CO, CO_2, and NO_X are collected continuously for analysis as in §86.127(b). Hydrocarbons, methanol and formaldehyde are collected using heated sample lines, and a heated FID is used for hydrocarbons analyses. Simultaneous with the gaseous exhaust collection and analysis, particulates from a proportional part of the diluted exhaust are collected continuously on a filter. The mass of particulate is determined by the procedure described in §86.139. This testing requires a dilution tunnel as well as the constant volume sampler.

(d) The evaporative emission test (gasoline-fueled vehicles and methanol-fueled vehicles) is designed to determine hydrocarbon and methanol evaporative emissions as a consequence of diurnal temperature fluctuation, urban driving, and hot soaks during parking. It is associated with a series of events representative of a motor vehicle's operation, which result in hydrocarbon and/or methanol vapor losses. The test procedure is designed to measure:

(1) Diurnal breathing losses resulting from daily temperature changes, measured by the enclosure technique;

(2) Running losses from suspected sources (if indicated by engineering analysis or vehicle inspection) resulting from a simulated trip on a chassis dynamometer, measured by carbon traps; and

(3) Hot soak losses, which result when the vehicle is parked and the hot engine is turned off, measured by the enclosure technique.

(e) Except in cases of component malfunction or failure, all emission control systems installed on or incorporated in a new motor vehicle shall be functioning during all procedures in