

§ 86.1215-85

than two percent, but less than ten percent, the gas may be relabeled with the new concentration.

[48 FR 1456, Jan. 12, 1983, as amended at 60 FR 34359, June 30, 1995]

§ 86.1215-85 EPA heavy-duty vehicle (HDV) urban dynamometer driving schedule.

(a)(1) The EPA dynamometer driving schedule for heavy-duty vehicles is a 1060 second transient speed versus time cycle which is designed to simulate gasoline-fueled HDV operation in urban areas. A second by second listing of this schedule is given in appendix I(d) of this part. Thirty-three percent of the cycle is idle operation, and the average vehicle speed is 18.9 mph (30.4 km/hr). The Administrator will use this driving schedule when conducting evaporative emission tests, as described in § 86.1230-96.

(2) For evaporative emission testing of heavy-duty vehicles a manufacturer may optionally use the dynamometer driving schedule for light-duty vehicles and light-duty trucks specified in appendix I(a) of this part. This driving schedule may not be used for exhaust emissions testing of heavy-duty vehicles. If the manufacturer chooses to use this option, the Administrator will use this driving schedule when conducting evaporative emission tests, as described in § 86.1230-96.

(b) The driver should attempt to follow the target schedule as closely as possible. The speed tolerance at any given time for these schedules, or for a driver's aid chart approved by the Administrator, are as follows:

(1) The upper limit is 4 mph (6.4 km/h) higher than the highest point on the trace within 1 second of the given time.

(2) The lower limit is 4 mph (6.4 km/h) lower than the lowest point on the trace within 1 second of the given time.

(3)(i) Speed variations greater than the tolerances (such as may occur during gear changes or braking spikes) are acceptable, provided they occur for less than 2 seconds on any occasion and are clearly documented as to the time and speed at that point of the driving schedule.

(ii) When conducted to meet the requirements of § 86.1229, up to three additional occurrences of speed vari-

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ations greater than the tolerance are acceptable, provided they occur for less than 15 seconds on any occasion, and are clearly documented as to the time and speed at that point of the driving schedule.

(4) Speeds lower than those prescribed are acceptable, provided the vehicle is operated at maximum available power during such occurrences.

[48 FR 1456, Jan. 12, 1983, as amended at 58 FR 16050, Mar. 24, 1993; 65 FR 59957, Oct. 6, 2000]

§ 86.1216-90 Calibrations; frequency and overview.

(a) Calibrations shall be performed as specified in § 86.1217 through § 86.1226.

(b) At least yearly or after any maintenance which could alter background emission levels, enclosure background emission measurements shall be performed.

(c) At least monthly or after any maintenance which could alter calibration, the following calibrations and checks shall be performed:

(1) Calibrate the hydrocarbon analyzer (see § 86.1221). Certain analyzers may require more frequent calibration depending on particular equipment and uses.

(2) Calibrate the dynamometer. If the dynamometer receives a weekly performance check (and remains within calibration) the monthly calibration need not be performed (see § 86.1218).

(3) Perform a hydrocarbon retention check and calibration on the evaporative emission enclosure (see § 86.1217).

(d) At least twice annually or after any maintenance perform a methanol retention check and calibration on the evaporative emission enclosure (see § 86.1217).

(e) Calibrate the methanol analyzer as often as required by the manufacturer or as necessary according to good practice.

[54 FR 14564, Apr. 11, 1989, as amended at 60 FR 34359, June 30, 1995]

§ 86.1217-90 Evaporative emission enclosure calibrations.

The calibration of the evaporative emission enclosure consists of three parts: Initial and periodic determination of enclosure background emissions (hydrocarbons and methanol); initial

determination of enclosure internal volume; and periodic hydrocarbon and methanol retention check and calibration. Methanol measurements may be omitted when methanol-fueled vehicles will not be tested in the evaporative enclosure.

(a) *Initial and periodic determination of enclosure background emissions.* Prior to its introduction into service, annually thereafter, and after any repair which can affect the enclosure background emissions, the enclosure shall be checked to determine that it does not contain materials which will themselves emit hydrocarbons or methanol.¹ Proceed as follows:

(1) Zero and span (calibrate if required) the hydrocarbon analyzer.

(2) Purge the enclosure until a stable background hydrocarbon reading is obtained.

(3) Turn on the mixing blower (if not already on).

(4) Seal enclosure and measure background hydrocarbon concentration, background methanol, temperature, and barometric pressure. These are the initial readings C_{HCl} , $C_{CH_3OH_i}$, T_i , and P_{Bi} , for the enclosure background determination.

(5) Allow the enclosure to stand undisturbed without sampling for four hours.

(6) Measure the hydrocarbon and methanol concentration on the same FID. These are the final concentrations, C_{HCl_f} and $C_{CH_3OH_f}$. Also measure final temperature and barometric pressure.

(7) Calculate the mass change of methanol, hydrocarbons, and hydrocarbons plus methanol in the enclosure according to the equations in paragraph (d) of this section. The enclosure background emissions (hydrocarbons plus methanol) shall not be greater than 0.4g for the 4 hours.

(b) *Initial determination of enclosure internal volume.* Prior to its introduc-

tion into service the enclosure internal volume shall be determined by the following procedure.

(1) Carefully measure the internal length, width and height of the enclosure, accounting for irregularities (such as braces) and calculate the internal volume.

(2) Perform an enclosure calibration check according to paragraphs (c) (1) through (7) of this section.

(3) If the calculated mass does not agree within ± 2 percent of the injected propane mass, then corrective action is required.

(c) *Hydrocarbon and methanol retention check and calibration.* The hydrocarbon and methanol retention check provides a check upon the calculated volume and also measures the leak rate. Prior to its introduction into service and at least monthly thereafter the enclosure leak rate shall be determined as follows:

(1) Zero and span (calibrate if required) the hydrocarbon analyzer.

(2) Purge the enclosure until a stable background hydrocarbon reading is obtained.

(3) Turn on the mixing blower (if not already on).

(4) Seal enclosure and measure background hydrocarbon concentration, background methanol, temperature, and barometric pressure. These are the initial readings C_{HCl} , $C_{CH_3OH_i}$, T_i and P_{Bi} for the enclosure calibration.

(5) Inject into the enclosure a known quantity of pure propane (4g is a convenient quantity) and a known quantity of pure methanol (4g is a convenient quantity) in gaseous form; i.e., at a temperature of at least 150-155 °F (65-68 °C). The propane and methanol may be measured by volume flow or by mass measurement. The method used to measure the propane and methanol shall have an accuracy of ± 0.5 percent of the measured value. (Less accurate methods may be used with the advanced approval of the Administrator.) The methanol and propane tests do not need to be conducted simultaneously.

(6) After a minimum of 5 minutes of mixing, analyze the enclosure atmosphere for hydrocarbon and methanol content, also record temperature and pressure. These measurements are the

¹NOTE: When methanol as well as hydrocarbons are present in the evaporative enclosure, the HFID hydrocarbon concentration measurement includes the partial response of the HFID to methanol plus the hydrocarbons. Determination of the HFID response to methanol, §86.1221, prior to its being placed in service is required for the determination of hydrocarbons.

final readings for the enclosure calibration as well as the initial readings for the retention check.

(7) To verify the enclosure calibration, calculate the mass of propane and the mass of methanol using the measurements taken in steps (4) and (6). See paragraph (d) of this section. This quantity must be within ±2 percent of that measured in step 5 above. (For 1991-1995 calendar years, the difference may exceed ±2 percent for methanol, provided it does not exceed ±6 percent.)

(8) Allow the enclosure to remain sealed for a minimum of 4 hours, analyze the enclosure atmosphere for hydrocarbon and methanol content; record temperature and barometric pressure. These are the final readings for the hydrocarbon and methanol retention check.

(9) Calculate, using the equation in paragraph (d) of this section and the readings taken in step (8), the hydrocarbon and methanol mass. It may not differ by more than ±4 percent of the value in step (6). (For 1991-1995 calendar year methanol-fueled vehicles, the difference may exceed ±4 percent for methanol, provided it does not exceed ±6 percent.)

(d) *Calculations.* (1) The calculation of net methanol and hydrocarbon mass change is used to determine enclosure background and leak rate. It is also used to check the enclosure volume measurements. The methanol mass change is calculated from the initial and final methanol samples, temperature and pressure according to the following equation:

$$M_{CH_3OH} = V \times \frac{T_{Ef}}{V_{Ef} \times T_{SHEDf}} [(C_{MS1f} AV_{1f}) + (C_{MS2f} AV_{2f})] - \frac{T_{Ei}}{V_{Ei} \times T_{SHEDI}} [(C_{MS1i} \times AV_{1i}) + (C_{MS2i} \times AV_{2i})]$$

Where:

- (i) M_{CH_3OH} =Methanol mass change, μ g.
- (ii) V =Enclosure volume, ft^3 , as measured in paragraph (b)(1) of this section.
- (iii) T_E =Temperature of sample withdrawn, $^{\circ}R$.
- (iv) V_E =Volume of sample withdrawn, ft^3 .
- (v) P_B =Barometric pressure at time of sampling, in. Hg.
- (vi) C_{MS} =GC concentration of test sample.

- (vii) AV =Volume of absorbing reagent in impinger.
- (viii) i =Initial sample.
- (ix) f =Final sample.
- (x) 1 =First impinger.
- (xi) 2 =Second impinger.
- (2) The hydrocarbon mass change is calculated from the initial and final FID readings of hydrocarbon concentration, methanol concentration with FID response to methanol, temperature, and pressure according to the following equation:

$$M_{HC} = kV \times 10^{-4} \frac{(C_{HCf} - rC_{CH_3OHf})}{T_f} \times P_{Bf} - \frac{(C_{HCi} - rC_{CH_3OHi})}{T_i} \times P_{Bi}$$

Where:

- (i) M_{HC} =Hydrocarbon mass change, g.
- (ii) C_{HC} =FID hydrocarbon concentration as ppm carbon including FID response to methanol in the sample.
- (iii) C_{CH_3OH} =Methanol concentration as ppm carbon.

$$= \frac{1.501 \times 10^{-3} \times T_e}{P_B \times V_E} \times [(C_{S1} \times AV_1) + (C_{S2} \times AV_2)]$$

(iv) V = Enclosure volume, ft³ (m³), as measured in paragraph (b)(1) of this section.

(v) r = FID response factor to methanol.

(vi) P_B = Barometric pressure, in. Hg (kPa).

(vii) T = Enclosure ambient temperature, °R (°K).

(viii) i = Indicates initial reading.

(ix) f = Indicates final reading.

(x) (A) k = 3.05

(B) For SI units, k = 17.60

NOTE: Hydrocarbon concentration is stated in ppm carbon, that is, ppm propane × 3. Expressions in parentheses are for SI units.

[54 FR 14564, Apr. 11, 1989, as amended at 60 FR 34359, June 30, 1995]

§ 86.1217-96 Evaporative emission enclosure calibrations.

The calibration of evaporative emission enclosures consists of three parts: initial and periodic determination of enclosure background emissions (hydrocarbons and methanol); initial determination of enclosure internal volume; and periodic hydrocarbon and methanol retention check and calibration. Methanol measurements may be omitted if methanol-fueled vehicles will not be tested in the evaporative enclosure. Alternate calibration methods may be used if shown to yield equivalent or superior results, and if approved in advance by the Administrator; specifically, more extreme temperatures may be used for determining calibration without affecting the validity of test results.

(a) *Initial and periodic determination of enclosure background emissions.* Prior to its introduction into service, annually thereafter, and after any repair that can affect the enclosure background emissions, the enclosure shall be checked to determine that it does not contain materials that will themselves emit hydrocarbons or methanol. When methanol as well as hydrocarbons are present in the evaporative enclosure, the HFID hydrocarbon concentration measurement includes the partial re-

sponse of the HFID to methanol plus the hydrocarbons. Determination of the HFID response to methanol, § 86.1221, prior to its being placed in service is required for the determination of hydrocarbons. Proceed as follows:

(1) Prepare the enclosure. (i) Variable-volume enclosures may be operated in either latched or unlatched volume configuration, as described in paragraph (b)(1) of this section. Ambient temperatures shall be maintained at 96±3 °F throughout the 4-hour period.

(ii) Fixed-volume enclosures may be operated with inlet and outlet flow streams either closed or open; if inlet and outlet flow streams are open, the air flowing into and out of the enclosure must be monitored in accordance with § 86.107-96(a)(1)(ii)(B). Ambient temperatures shall be maintained at 96±3 °F throughout the 4-hour period.

(iii) For running loss enclosures ambient temperatures shall be maintained at 95±3 °F throughout the 4-hour period. For running loss enclosures designed with a vent for makeup air, the enclosure shall be operated with the vent closed.

(2) The enclosure may be sealed and the mixing fan operated for a period of up to 12 hours before the 4-hour background sampling period begins.

(3) Zero and span (calibrate if required) the hydrocarbon analyzer.

(4) Prior to the background determination, purge the enclosure until a stable background hydrocarbon reading is obtained.

(5) Turn on the mixing blower (if not already on).

(6) Seal enclosure and measure background hydrocarbon concentration, background methanol, temperature, and barometric pressure. These are the initial readings C_{HCl}, C_{CH₃OH}, and P_{Bi}, T_i for the enclosure background determination.

(7) Allow the enclosure to stand undisturbed for four hours.