percent in §86.117–90), and instead require compliance with higher tolerances (not to exceed ±6 percent for recoveries and ±8 for retention), provided that:

(1) The Administrator determines that compliance with these specified tolerances is not practically feasible; and

(2) The manufacturer makes information available to the Administrator which indicates that the calibration tests and their results are consistent with good laboratory practice, and that the results are consistent with the results of calibration testing conducted by the Administrator.

[56 FR 25774, June 5, 1991, as amended at 58 FR 58422, Nov. 1, 1993; 59 FR 33913, July 1, 1994; 60 FR 34342, June 30, 1995]

§ 86.117–90 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.* Proceed as follows:

*NOTE: 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, §86.121, prior to its being placed in service is required for the determination of hydrocarbons.

(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_{HCi}, C_{CH3OHi}, and P_{Bi}, T_i, for the enclosure background determination.

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

(6) Measure the hydrocarbon concentration on the same FID and the methanol level. These are the final concentrations, C_{HCf} and C_{CH3OHf}. 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 introduction 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 (organic gas) retention check and calibration.* The hydrocarbon and methanol (if the enclosure is used for methanol-fueled vehicles) 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 methanol check can be performed less frequently, provided it is performed at least twice annually) 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_{HCi}, C_{CH3OHi}, 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 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 ±8 percent for 1991 testing and ±6 percent for 1992–1995 testing.)

(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 equations 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 years, the difference may exceed ±4 percent for methanol, provided it does not exceed ±8 percent for 1991 testing and ±6 percent for 1992–1995 testing.)

(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:

$$M_{CH3OH} = V_X \times \frac{TE_f}{VE_f \times T_{SHEDf}} \left(C_{MX1i} \times AV_{1f}\right) + \left(C_{MS2f} \times AV_{2f}\right)$$

$$- \frac{TE_i}{VE_i \times T_{SHED_i}} \left(C_{MS1i} \times AV_{1i}\right) + \left(C_{MS1i} \times AV_{2i}\right)$$

Where:

(i) M_{CH3OH}=Methanol mass change, μg.

(ii) V=Enclosure volume, ft^3, as measured in paragraph (b)(1) of this section.

(iii) TE=Temperature of sample withdrawn, °R.

(iv) T_{SHED}=Temperature of SHED, °R.

(v) VE=Volume of sample withdrawn, ft^3.

(vi) P_B=Barometric pressure at time of sampling, in. Hg.

(vii) C_{MS}=GC concentration of test sample.

(viii) AV=Volume of absorbing reagent in impinger (ml).

(ix) i=Initial sample.

(x) f=Final sample.
(xi) 1=First impinger.
(xii) 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:

$$M_{HC} = kV \times 10^{-4}\left(\frac{\left(C_{HCf} - rC_{CH3OH_f}\right)\times P_{Bf}}{T_f} - \frac{\left(C_{HCi} - rC_{CH3OH_i}\right)\times P_{Bi}}{T_i}\right)$$

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_{CH3OH}=Methanol concentration as ppm carbon

$$= \frac{1.501\times10^{-3}\times T_E}{P_B \times V_E}\left[\left(C_{Sl}\times AV_1\right)+\left(C_2\times AV_2\right)\right]$$

(iv) V=Enclosure volume ft^3 (m^3), 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 14516, Apr. 11, 1989, as amended at 60 FR 34342, June 30, 1995]

§86.117–96 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 response of the HFID to methanol plus the hydrocarbons. Determination of the HFID response to methanol, §86.121, prior to its being placed in service is required for the determination of hydrocarbons. Proceed as follows: