

## Environmental Protection Agency

## § 86.142-90

### § 86.142-90 Records required.

The following information shall be recorded with respect to each test:

- (a) Test number.
- (b) System or device tested (brief description).
- (c) Date and time of day for each part of the test schedule.
- (d) Test results.
- (e) Driver and equipment operator IDs.
- (f) *Vehicle*. ID number, manufacturer, model year, standards, engine family, evaporative emissions family, basic engine description (including displacement, number of cylinders, turbo-/supercharger used, and catalyst usage), fuel system (including number of carburetors, number of carburetor barrels, fuel injection type, and fuel tank(s) capacity and location), engine code, gross vehicle weight rating, inertia weight class, actual curb weight at zero miles, actual road load at 50 mph (80 kph), transmission configuration, axle ratio, car line, system miles, idle rpm, and drive wheel tire pressure, as applicable.
- (g) *Dynamometer*. Dynamometer ID, inertia weight setting, indicated power absorption setting, records to verify compliance with the vehicle speed versus time requirements of the test, and driving distance for each of the three phases of the test, calculated from the measured roll or shaft revolutions.
- (h) *Gas analyzers*. Analyzer bench ID, analyzer ranges, recordings of analyzer output during zero, span, and sample readings.
- (i) Recorder charts: Test number, date, vehicle ID, operator ID, and identification of the measurements recorded.
- (j) Test cell barometric pressure, ambient temperature, and humidity.  
NOTE: A central laboratory barometer may be used: *Provided*, that individual test cell barometric pressures are shown to be within  $\pm 0.1$  percent of the barometric pressure at the central barometer location.
- (k) *Temperatures*. Records to verify compliance with the ambient temperature requirements throughout the test procedure and recordings of vehicle fuel temperature(s) during the diurnal test and of the enclosure temperatures during the diurnal and hot soak tests.

(l) *CFV-CVS*. Total dilute exhaust volume ( $V_{mix}$ ) for each phase of the exhaust test.

(m) *PDP-CVS*. Test measurements required to calculate the  $V_{mix}$ . Total dilute exhaust volume ( $V_{mix}$ ) for each phase of the exhaust test.

(n) The humidity of the dilution air.

NOTE: If conditioning columns are not used (see §§86.122 and 86.144) this measurement can be deleted. If the conditioning columns are used and the dilution air is taken from the test cell, the ambient humidity can be used for this measurement.

(o) *Additional records required for diesel vehicles*. (1) Pressure and temperature of the dilute exhaust mixture (and background air if sampled) at the inlet to the gas meter used for particulate sampling.

(2) The temperature of the dilute exhaust mixture inside the dilution tunnel near the inlet of the particulate probe.

(3) The temperature of the gas flowing in the heated sample line before the heated filter, and also before the HFID, and the temperature of the control system of the heated hydrocarbon detector.

(4) Gas meter or flow measurement instrumentation readings at the start of each sample period and at the end of each sample period.

(5) The stabilized pre-test weight and post-test weight of each particulate sample and back-up filter.

(6) Continuous temperature and humidity recording of the ambient air in which the particulate filters were stabilized.

(p) *Additional required records for methanol-fueled vehicles*. (1) Specification of the methanol-fuel or methanol-fuel mixtures used during the test.

(2) Volume of sample passed through the methanol sampling system and the volume of deionized water in each impinger.

(3) The concentration of the GC analyses of the test samples (methanol).

(4) Volume of sample passed through the formaldehyde sampling system and the volume of DNPH solution used.

(5) The concentration of the HPLC analysis of the test sample (formaldehyde).

(6) The temperatures of the sample lines before the HFID and the impinger, the temperature of the exhaust

transfer duct (as applicable), and the temperature of the control system of the heated hydrocarbon detector.

(7) A continuous measurement of the dew point of the raw and diluted exhaust. This requirement may be omitted if the temperatures of all heated lines are kept above 220 °F, or if the manufacturer performs an engineering analysis demonstrating that the temperature of the heated systems remains above the maximum dew point of the gas stream throughout the course of the test.

(q) *Additional required records for natural gas-fueled vehicles.* Composition, including all carbon containing compounds; e.g. CO<sub>2</sub>, of the natural gas-fuel used during the test. C<sub>1</sub> and C<sub>2</sub> compounds shall be individually reported. C<sub>3</sub> and heavier hydrocarbons, and C<sub>6</sub> and heavier compounds may be reported as a group.

(r) *Additional required records for liquefied petroleum gas-fueled vehicles.* Com-

position of the liquefied petroleum gas-fuel used during the test. Each hydrocarbon compound present, through C<sub>4</sub> compounds, shall be individually reported. C<sub>5</sub> and heavier hydrocarbons may be reported as a group.

[54 FR 14533, Apr. 11, 1989, as amended at 58 FR 58422, Nov. 1, 1993; 59 FR 48510, Sept. 21, 1994; 60 FR 34348, June 30, 1995]

**§ 86.143-96 Calculations; evaporative emissions.**

(a) The following equations are used to calculate the evaporative emissions from gasoline- and methanol-fueled vehicles, and for gaseous-fueled vehicles.

(b) Use the measurements of initial and final concentrations to determine the mass of hydrocarbons and methanol emitted. For testing with pure gasoline, methanol emissions are assumed to be zero.

(1) For enclosure testing of diurnal, hot soak, and running loss emissions:

(i) Methanol emissions:

$$M_{\text{CH}_3\text{OH}} = V_n \times \left[ \frac{(C_{\text{MS1f}} \times AV_{1f}) + (C_{\text{MS2f}} \times AV_{2f})}{V_{\text{E}_f}} \right] - \left[ \frac{(C_{\text{MS1i}} \times AV_{1i}) + (C_{\text{MS2i}} \times AV_{2i})}{V_{\text{E}_i}} \right] + (M_{\text{CH}_3\text{OH, out}} - M_{\text{CH}_3\text{OH, in}})$$

Where:

- (A) M<sub>CH<sub>3</sub>OH</sub> = Methanol mass change, µg.
- (B) V<sub>n</sub> = Net enclosure volume, ft<sup>3</sup>, as determined by subtracting 50 ft<sup>3</sup> (1.42 m<sup>3</sup>) (volume of vehicle with trunk and windows open) from the enclosure volume. A manufacturer may use the measured volume of the vehicle (instead of the nominal 50 ft<sup>3</sup>) with advance approval by the Administrator: *Provided*, the measured volume is determined and used for all vehicles tested by that manufacturer.
- (C) [Reserved]
- (D) V<sub>E</sub> = Volume of sample withdrawn, ft<sup>3</sup>. Sample volumes must be corrected for differences in temperature to be consistent with determination of V<sub>n</sub>, prior to being used in the equation.

- (E) [Reserved]
- (F) C<sub>MS</sub> = GC concentration of sample, µg/ml.
- (G) AV = Volume of absorbing reagent in impinger.
- (H) P<sub>B</sub> = Barometric pressure at time of sampling, in. Hg.
- (I) i = Initial sample.
- (J) f = Final sample.
- (K) 1 = First impinger.
- (L) 2 = Second impinger.
- (M) M<sub>CH<sub>3</sub>OH, out</sub> = mass of methanol exiting the enclosure, in the case of fixed-volume enclosures for diurnal emission testing, µg.
- (N) M<sub>CH<sub>3</sub>OH, in</sub> = mass of methanol entering the enclosure, in the case of fixed-volume enclosures for diurnal emission testing, µg.

(ii) Hydrocarbon emissions:

$$M_{\text{HC}} = (kV_n \times 10^{-4}) \times \left( \frac{(C_{\text{HC}_f} - rC_{\text{CH}_3\text{OH}_f})P_{\text{B}_f}}{T_f} - \frac{(C_{\text{HC}_i} - rC_{\text{CH}_3\text{OH}_i})P_{\text{B}_i}}{T_i} \right) + M_{\text{HC, out}} - M_{\text{HC, in}}$$

Where,

(A) M<sub>HC</sub> = Hydrocarbon mass change, g.