Environmental Protection Agency

§ 86.1342–94

BSFC + (1/7)(4.24) = (6/7)(4.17) + (6/7)(7.945) + (6/7)(7.078) = 0.592 lbs of fuel/BHP–hr

(i) For dilute sampling systems which require conversion of as-measured dry concentrations to wet concentrations, the following equation shall be used for any combination of bagged, continuous, or fuel mass-approximated sample measurements (except for CO measurements made through conditioning columns, as explained in paragraph (d)(3) of this section):

Wet concentration = \( K_w \times \text{dry concentration} \)

Where:

(1) For English units,

\[ K_w = 1 - \left( \frac{\alpha(200)}{7000} + \frac{1.608}{H} \right) \]

See paragraph (d)(1) of this section for \( \alpha \) values.

(ii) For SI units,

\[ K_w = 1 - \left( \frac{\alpha(200)}{1000} + \frac{1.608}{H} \right) \]

See paragraph (d)(1) of this section for \( \alpha \) values.

(2) \( CO_2 \) is either \( CO_2 \) or \( CO_2' \) as applicable.

(3)(i) \( H \) = Absolute humidity of the CVS dilution air, in grains (grams) of water per lb (kg) of dry air.

(ii) For English units,

\[ H = \left[ \frac{(43.478)R_i \times P_d}{(1.008)P_i} \right] \]

(iii) For SI units,

\[ H = \left[ \frac{(6.211)R_i \times P_d}{(1.008)P_i} \right] \]

(4) \( R_i \) = Relative humidity of the CVS dilution air, in percent.

(5) \( P_s \) = Saturated vapor pressure, in mm Hg (kPa) at the ambient dry bulb temperature of the CVS dilution air.

(6) \( P_b \) = Barometric pressure, mm Hg (kPa).

See paragraph (d)(1) of this section for \( R_i \) values.


§ 86.1342–94 Calculations; exhaust emissions.

Section 86.1342–94 includes text that specifies requirements that differ from § 86.1342–90. Where a paragraph in § 86.1342–90 is identical and applicable to § 86.1342–94, this may be indicated by specifying the corresponding paragraph and the statement "[Reserved]. For guidance see § 86.1342–90."
is hydrogen to carbon ratio as measured for the fuel used.

Where:

(d)(3)(vi) through (d)(5)(iii)(B) [Reserved]. For guidance see §86.1342–90.

(d)(5)(iv)(A) $C_{\text{CH}_3\text{OH}_{\text{HE}}}$ = Methanol concentration in the dilute exhaust, in ppm.

(B)

$$C_{\text{CH}_3\text{OH}_{\text{HE}}} = \frac{3.813 \times 10^{-2} \times T_{\text{EM}} \left( (C_{S_1} \times AV_{S_1}) + (C_{S_2} \times AV_{S_2}) \right)}{P_B \times V_{\text{EM}}}$$

(v)(A) $C_{\text{CH}_3\text{OH}_{\text{HD}}}$ = Methanol concentration in the dilution air, in ppm

$$C_{\text{CH}_3\text{OH}_{\text{HD}}} = \frac{3.813 \times 10^{-2} \times T_{\text{DM}} \left( (C_{D_1} \times AV_{D_1}) + (C_{D_2} \times AV_{D_2}) \right)}{P_B \times V_{\text{DM}}}$$

(vi) $T_{\text{EM}}$ = Temperature of methanol sample withdrawn from dilute exhaust, °R

(vii) $T_{\text{DM}}$ = Temperature of methanol sample withdrawn from dilution air, °R

(viii) $P_B$ = Barometric pressure during test, mm Hg

(ix) $V_{\text{EM}}$ = Volume of methanol sample withdrawn from dilute exhaust, ft³

(x) $V_{\text{DM}}$ = Volume of methanol sample withdrawn from dilution air, ft³

(xi) $C_S$ = GC concentration of sample drawn from dilute exhaust

(xii) $C_D$ = GC concentration of sample drawn from dilution air

(xiii) $AV_{\text{e}}$ = Volume of absorbing reagent (deionized water) in impinger through which methanol sample from dilute exhaust is drawn, ml

(xiv) $AV_{\text{D}}$ = Volume of absorbing reagent (deionized water) in impinger through which methanol sample from dilution air is drawn, ml

(xv) 1 = first impinger.

(xvi) 2 = second impinger.

(d)(6)(i) through (d)(7)(i) [Reserved]. For guidance see §86.1342–90.

(d)(7)(ii) For methanol-fueled vehicles, where fuel composition is $C_X H_Y O_Z$ as measured, or calculated, for the fuel used:

$$DF = \frac{(100)x + y/2 = 3.76(x + y/2 - z/2)}{\text{CO}_2 + (\text{HC}_e + \text{CO}_e + \text{CH}_3\text{OH}_e + \text{HCHO}_e)}$$

(d)(8)(i) [Reserved]. For guidance see §86.1342–90.

(d)(8)(ii) For Otto-cycle engines: $K_B = 1/\{1–0.0047(H–75)\}$ (or for SI units, $K_B = 1/\{1–0.0329(H–10.71)\}$).

(iii) For diesel engines: $K_B = 1/\{1–0.0026 (H–75)\}$ (or for SI units = 1/\{1–0.0182 (H–10.71)\}).

Where:

(d)(8)(iv) through (d)(9)(x) [Reserved]. For guidance see §86.1342–90.

(d)(10)(i) $\text{NMHC}_{\text{conc}} = \text{HC}_{\text{conc}} - \text{CH}_4_{\text{conc}}$

(ii) Density of non-methane hydrocarbon, is $1.1771(12.011 + H/C (1.008))$ g/ft³-carbon atom

(0.04157(12.011 + H/C (1.008))) kg/m³-carbon
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atom), where H/C is the hydrogen to carbon ratio of the non-methane hydrocarbon components of the test fuel, at 68 °F (20 °C) and 760 mm Hg (101.3 kPa) pressure.

(iii)(A) CH₄conc = Methane concentration of the dilute exhaust sample corrected for background, in ppm carbon equivalent.

(B) CH₄conc = rCH₄ × (CH₄e–CH₄d(1–1/DF))

Where:

(1) CH₄e = Methane exhaust bag concentration in ppm carbon equivalent.

(2) CH₄d = Methane concentration of the dilution air in ppm carbon equivalent.

(3) rCH₄ = HC FID response to methane for natural gas-fueled vehicles as measured in § 86.1321 (d).

(e) Through (i) [Reserved]. For guidance see § 86.1342–90.


§ 86.1343–88 Calculations; particulate exhaust emissions.

(a) The final reported transient emission test results shall be computed by use of the following formula:

Pwmm = \frac{1/7 P_C + 6/7 P_H}{1/7 BHP – hr_C + 6/7 BHP – hr_H}

(1) Pwmm = Weighted mass particulate, grams per brake horsepower-hour.

(2) P_C = Mass particulate measured during the cold-start test, grams.

(3) P_H = Mass particulate measured during the hot-start test, grams.

(4) BHP-hr_C = Total brake horsepower-hour (brake horsepower integrated with respect to time) for the cold-start test.

(5) BHP-hr_H = Total brake horsepower-hour (brake horsepower integrated with respect to time) for the hot-start test.

(b) The mass of particulate for the cold-start test and the hot-start test is determined from the following equation:

P_{\text{mass}} = (V_{\text{mix}} + V_{\text{sf}}) \times \left[ \frac{P_f}{V_f} - \left( \frac{P_{bf}}{V_{bf}} \times [1 - (1/DF)] \right) \right]

(1) P_{\text{mass}} = Mass of particulate emitted per test phase, grams per test phase. 

(P_H = P_{\text{mass}} for the hot-start test and P_C = P_{\text{mass}} for the cold-start test.

(2) V_{\text{mix}} = Total dilute exhaust volume corrected to standard conditions (528° R (293° K) and 760 mm Hg (101.3 kPa)), cubic feet per test phase. For a PDP-CVS:

V_{\text{mix}} = V_o \times \frac{N(P_B - P_d)(528° R)}{(760 \text{ mm Hg})(T_p)}

in SI units,

V_{\text{mix}} = V_o \times \frac{N(P_B - P_d)(293° K)}{(101.3 \text{ kPa})(T_p)}

Where:

(i) V_o = Volume of gas pumped by the positive displacement pump, cubic feet (cubic meters) per revolution. This volume is dependent on the pressure...