

Environmental Protection Agency

§ 1065.672

§ 1065.667 Dilution air background emission correction.

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(b) You may determine the total flow of dilution air by a direct flow measurement. In this case, calculate the total mass of background as described in §1065.650(b), using the dilution air flow, n_dil. Subtract the background mass from the total mass. Use the result in brake-specific emission calculations.

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§ 1065.670 NOx intake-air humidity and temperature corrections.

See the standard-setting part to determine if you may correct NOx emis-

sions for the effects of intake-air humidity or temperature. Use the NOx intake-air humidity and temperature corrections specified in the standard-setting part instead of the NOx intake-air humidity correction specified in this part 1065. If the standard-setting part allows correcting NOx emissions for intake-air humidity according to this part 1065, first apply any NOx corrections for background emissions and water removal from the exhaust sample, then correct NOx concentrations for intake-air humidity using one of the following approaches:

(a) Correct for intake-air humidity using the following equation:

x_NOxcor = x_NOxuncor · (9.953 · x_H2O + 0.832) Eq. 1065.670-1

Example:

- x_NOxuncor = 700.5 μmol/mol
x_H2O = 0.022 mol/mol
x_NOxcor = 700.5 · (9.953 · 0.022 + 0.832)
x_NOxcor = 736.2 μmol/mol

(b) Develop your own correction, based on good engineering judgment.

EFFECTIVE DATE NOTE: At 73 FR 33738, June 30, 2008, §1065.670 was amended by revising the introductory text, effective July 7, 2008. For the convenience of the user, the revised text is set forth as follows:

§ 1065.670 NOx intake-air humidity and temperature corrections.

See the standard-setting part to determine if you may correct NOx emissions for the effects of intake-air humidity or temperature. Use the NOx intake-air humidity and temperature corrections specified in the standard-setting part instead of the NOx intake-air humidity correction specified in this part 1065. If the standard-setting part does not prohibit correcting NOx emissions for intake-air humidity according to this part 1065, first apply any NOx corrections for background emissions and water removal from the exhaust sample, then correct NOx concentrations for intake-air humidity. You may use a time-weighted mean combustion air humidity to calculate this correction if your combustion air humidity remains within a tolerance of ± 0.0025 mol/mol of the mean value over the test interval. For intake-air humidity correction, use one of the following approaches:

§ 1065.672 Drift correction.

(a) Scope and frequency. Perform the calculations in this section to determine if gas analyzer drift invalidates the results of a test interval. If drift does not invalidate the results of a test interval, correct that test interval's gas analyzer responses for drift according to this section. Use the drift-corrected gas analyzer responses in all subsequent emission calculations. Note that the acceptable threshold for gas analyzer drift over a test interval is specified in §1065.550 for both laboratory testing and field testing.

(b) Correction principles. The calculations in this section utilize a gas analyzer's responses to reference zero and span concentrations of analytical gases, as determined sometime before and after a test interval. The calculations correct the gas analyzer's responses that were recorded during a test interval. The correction is based on an analyzer's mean responses to reference zero and span gases, and it is based on the reference concentrations of the zero and span gases themselves. Validate and correct for drift as follows:

(c) Drift validation. After applying all the other corrections—except drift correction—to all the gas analyzer signals, calculate brake-specific emissions according to §1065.650. Then correct all

§ 1065.672

40 CFR Ch. I (7-1-08 Edition)

gas analyzer signals for drift according to this section. Recalculate brake-specific emissions using all of the drift-corrected gas analyzer signals. Validate and report the brake-specific emission results before and after drift correction according to § 1065.550.

(d) *Drift correction.* Correct all gas analyzer signals as follows:

(1) Correct each recorded concentration, x_i , for continuous sampling or for batch sampling, \bar{x} .

(2) Correct for drift using the following equation:

$$x_{\text{idrift corrected}} = x_{\text{refzero}} + \frac{2 \cdot x_{\text{refspan}}}{x_{\text{prespan}} + x_{\text{postspan}}} \cdot \left(x_i - \frac{x_{\text{prezero}} + x_{\text{postzero}}}{2} \right) \quad \text{Eq. 1065.672-1}$$

Where:

$x_{\text{idrift corrected}}$ = concentration corrected for drift.

x_{refzero} = reference concentration of the zero gas, which is usually zero unless known to be otherwise.

x_{refspan} = reference concentration of the span gas.

x_{prespan} = pre-test interval gas analyzer response to the span gas concentration.

x_{postspan} = post-test interval gas analyzer response to the span gas concentration.

x_i or \bar{x} = concentration recorded during test, before drift correction.

x_{prezero} = pre-test interval gas analyzer response to the zero gas concentration.

x_{postzero} = post-test interval gas analyzer response to the zero gas concentration.

Example:

$x_{\text{refzero}} = 0 \mu\text{mol/mol}$

$x_{\text{refspan}} = 1800.0 \mu\text{mol/mol}$

$x_{\text{prespan}} = 1800.5 \mu\text{mol/mol}$

$x_{\text{postspan}} = 1695.8 \mu\text{mol/mol}$

x_i or $\bar{x} = 435.5 \mu\text{mol/mol}$

$x_{\text{prezero}} = 0.6 \mu\text{mol/mol}$

$x_{\text{postzero}} = -5.2 \mu\text{mol/mol}$

$$x_{\text{idrift corrected}} = 0 + \frac{2 \cdot 1800.0}{1800.5 + 1695.8} \cdot \left(435.5 - \frac{0.6 + (-5.2)}{2} \right)$$

$x_{\text{idrift corrected}} = 450.8 \mu\text{mol/mol}$

(3) For any pre-test interval concentrations, use concentrations determined most recently before the test interval. For some test intervals, the most recent pre-zero or pre-span might have occurred before one or more previous test intervals.

(4) For any post-test interval concentrations, use concentrations determined most recently after the test interval. For some test intervals, the most recent post-zero or post-span might have occurred after one or more subsequent test intervals.

(5) If you do not record any pre-test interval analyzer response to the span gas concentration, x_{prespan} , set x_{prespan} equal to the reference concentration of the span gas:

$$x_{\text{prespan}} = x_{\text{refspan}}$$

(6) If you do not record any pre-test interval analyzer response to the zero

gas concentration, x_{prezero} , set x_{prezero} equal to the reference concentration of the zero gas:

$$x_{\text{prezero}} = x_{\text{refzero}}$$

(7) Usually the reference concentration of the zero gas, x_{refzero} , is zero: $x_{\text{refzero}} = 0 \mu\text{mol/mol}$. However, in some cases you might know that x_{refzero} has a non-zero concentration. For example, if you zero a CO₂ analyzer using ambient air, you may use the default ambient air concentration of CO₂, which is 375 $\mu\text{mol/mol}$. In this case, $x_{\text{refzero}} = 375 \mu\text{mol/mol}$. Note that when you zero an analyzer using a non-zero x_{refzero} , you must set the analyzer to output the actual x_{refzero} concentration. For example, if $x_{\text{refzero}} = 375 \mu\text{mol/mol}$, set the analyzer to output a value of 375 $\mu\text{mol/mol}$ when the zero gas is flowing to the analyzer.