PS-18 Frequently Asked Questions

 Equation 7 in Performance Specification 18 (PS-18), used to calculate the zero-calibration drift, does not calculate drift as described in section 3.4 of PS-18 – is it accurate? Also, how does one use equation 7 to calculate zero calibration drift for an IP-CEMS that excludes the source measurement optical path?

Note: There appears to be an error in equation 7 of PS-18. As a result, we are placing this discussion here to document this issue and will include these corrections in our next method update package.

Relevant Regulatory Language

- Section 3.4 of PS-18 says calibration drift (CD) is "the absolute value of the difference between the CEMS output response and an upscale reference gas or a zero-level gas, expressed as a percentage of the span value...".
- Section 11.8.6.2 of PS-18 then states to "calculate CD for IP-CEMS using equations 4, 5, 6A, 6B and 7 in section 12.4."
- Section 12.4.4 contains Equation 7 which is to be used to calculate the zero CD as a percent of span for an IP-CEMS.
- The current version of equation 7:

$$CD_0 = \frac{(|(MC_l - MN_b) - (MC_{l+1} - MN_b)|)}{S} * 100$$
 Eq. 7

The current version of equation 7 does not agree with the definition of calibration drift given in section 3.4 of PS-18 and included above. Additionally, this equation does not seem to apply to IP-CEMS that exclude the source measurement optical path. Based on this, we feel that equation 7 is not accurate and the following equations should be used to calculate zero calibration drift for IP-CEMS that include and exclude the source measurement optical path.

First, for IP-CEMS that exclude the source measurement optical path the zero-calibration drift should be calculated using the following equation:

$$CD_0 = \frac{\left|MC_i - C_{i,eff}\right|}{S} * 100$$

Where:

CD₀ = Calibration drift at zero HCl concentrations for an IP-CEMS (percent);

MC_i = Measured HCl reference gas concentration i (ppmv);

C_{i,eff} = Equivalent concentration of the reference gas value, C_i, at the specified conditions (ppmv); S = Span value (ppmv).

Additionally, for IP-CEMS that include the source measurement optical path, the zero-calibration drift should be calculated using the following equation:

$$CD_0 = \frac{\left| (MC_i - MN_{bi}) - C_{i,eff} \right|}{S} * 100$$

Where:

CD₀ = Calibration drift at zero HCl concentrations for an IP-CEMS (percent);

MC_i = Measured HCl reference gas concentration i (ppmv);

MN_{bi} = Measured native concentration bracketing each calibration check measurement (ppmv);

C_{i,eff} = Equivalent concentration of the reference gas value, C_i, at the specified conditions (ppmv); S = Span value (ppmv).