

Equation for Use with Isokinetic Sampling

Reference: Hangal, Sunil and Klaus Willeke, "Aspiration Efficiency: Unified Model for All Forward Sampling Angles", Environ. Sci. Technol. 24: 688-691 (1990).

$$E_a = 1 + (R \cos \theta - 1) \left[1 - \frac{1}{1 + \left(2 + \frac{0.617}{R} \right) \text{Stk}} \right]$$

where:

$$\text{Stk} = \frac{d^2 \rho_p C_c V_{\text{wind}}}{18 \mu D_{\text{probe}}}$$

θ = angle between probe and wind

R = wind velocity/probe velocity

d = particle diameter

$$E_t = \exp[-4.7 K^{0.75}]$$

where:

$$K = \sqrt{\frac{\text{Stk} Z}{\sqrt{\text{Re}}}}$$

$$Z = \frac{L V_t}{D_{\text{probe}} V_{\text{probe}}}$$

L = probe length

V_t = particle's terminal settling velocity

$$\text{Re} = \frac{D_{\text{probe}} V_{\text{probe}} \rho_g}{\mu}$$