ERRATA SHEET FOR
ANSI/AMCA STANDARD 210-16 (ANSI/ASHRAE STANDARD 51-2016) Laboratory Methods of Testing Fans for Certified Aerodynamic Performance rating
July 30, 2018

The corrections listed in this errata sheet apply to the all printings of ANSI/AMCA 210-2016 (ANSI/ASHRAE STANDARD 51-2016).

<table>
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<th>Erratum</th>
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<td>16</td>
<td>Change Eq. 7.18 SI to read: ( \text{Re} = \frac{\sqrt{2\bar{\mu}}}{\bar{C}<em>D} \sqrt{\frac{\Delta P</em>{\rho_x}}{1 - E\beta^4}} )</td>
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<tr>
<td>16</td>
<td>Change Eq. 7.18 I-P to read: ( \text{Re} = \frac{1097.8\bar{C}<em>D}{60\bar{\mu}} \sqrt{\frac{\Delta P</em>{\rho_x}}{1 - E\beta^4}} )</td>
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<tr>
<td>18</td>
<td>Change Eq. 7.33 SI to read: ( \text{Re} = \frac{D_hV_p}{\bar{\mu}} )</td>
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<td>19</td>
<td>Change Eq. 7.33 I-P to read: ( \text{Re} = \frac{D_hV_p}{60\bar{\mu}} )</td>
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<td>67</td>
<td>In section G.3, Step 1-1, first line, change equation to read: ( \text{Re} = \frac{1097.8}{60\bar{\mu}_6} \bar{C}<em>e \sqrt{\frac{\Delta P</em>{\rho_5}}{1 - E\beta^4}} )</td>
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<td>67</td>
<td>In section G.3, after a constant was changed in a previous edition (1096 was changed to 1097.8), the example calculation that followed was not corrected. Section G.3, as shown below, includes corrected numbers indicated by a highlight.</td>
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<td>67</td>
<td>In the last line of Section G.4, change to read, &quot;The formula is based on ( C = 9.5, Y = 0.9.6, E = 1.0, ) and ( \bar{\mu}_6 = 1.222 \times 10^{-5} \text{ lbm/ft-s.} )</td>
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G.3 Example iteration
Iteration 1

Step 1-1 — Calculate \( \text{Re} \), using:

\[ \text{Re} = \frac{1097.8}{\bar{\mu}_6} \bar{C}_e \sqrt{\frac{\Delta P_{\rho_5}}{1 - E\beta^4}} \]
Where:

\[ \mu_6 = 1.222 \times 10^{-5} \text{ lbm/ft\cdot s} \]

\[ C_e = 0.99 \text{ (estimated)} \]

\[ D_6 = 6 \text{ in.} = 0.5 \text{ ft} \]

\[ \gamma = 0.998 \text{ (calculate per Section 7.3.1.3)} \]

\[ \Delta P = 1.005 \text{ in. wg} \]

\[ \rho = 0.0711 \text{ lbm/ft}^3 \]

\[ (1 - E^2) = 1 \text{ for iteration purposes} \]

\[
Re_1 = \frac{1097.8}{(60)(1.222 \times 10^{-5})(0.99)(0.5)(0.998)\sqrt{(1.005)(0.0711)}}
\]

\[ Re_1 = 197,722 \]

**Step 1-2**

Calculate \( C_e_1 \), using \( Re_1 \) from the previous step, assuming that \( L/D = 0.6 \):

\[ C_e_1 = 0.9986 - \frac{7.006}{\sqrt{Re_1}} + \frac{134.6}{Re_1} \]

\[ C_e_1 = 0.9986 - \frac{7.006}{\sqrt{197,722}} + \frac{134.6}{197,722} \]

\[ C_e_1 = 0.9835 \]

**Check:** \[ |C_e - C_e_1| = |0.99 - 0.9835| = 0.0065 \]

Since 0.0065 > 0.001, a second iteration is required.

**Iteration 2**

**Step 2-1 — Re-estimate \( Re \), using \( C_e_1 \):**

\[ Re_2 = Re_1 \left( \frac{C_e_1}{C_e} \right) \]

\[ Re_2 = 197,722 \left( \frac{0.9835}{0.99} \right) \]

\[ Re_2 = 196,424 \]

**Step 2-2 — Recalculate \( C \), using \( Re_2 \):**

\[ C_e_2 = 0.9986 - \frac{7.006}{\sqrt{Re_2}} + \frac{134.6}{Re_2} \]
\[ Ce_2 = 0.9986 - \frac{7.006}{\sqrt{196424}} + \frac{134.6}{196424} \]

\[ Ce_2 = 0.9835 \]

**Check:** \(|Ce_1 - Ce_2| = |0.9831 - 0.9835| = 0.0004\)

Since 0.0004 < 0.001, no further iterations are required, and \( Ce_2 = 0.9835 = C \).

If, for some unusual conditions, the iterations do not converge, then try a different starting initial guess for \( Ce \).