The corrections listed in this errata sheet apply to all copies of ANSI/ASHRAE Standard 90.4-2022. The first printing is identified on the outside back cover as “Product code: 86237 2/23”.

**Chart C-1 Calculation of UPS Segment of ELC**

(Example Based on Modular UPS with N+1 Redundancy Designed at 80% Normal Loading)

Revise the equations in the columns shown below. Changes are highlighted in yellow.

(Note: Additions are shown in underline and deletions are shown in strikethrough.)

<table>
<thead>
<tr>
<th>UPS Total Capacity, kW</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>550</td>
<td>g</td>
</tr>
<tr>
<td>f</td>
<td></td>
</tr>
</tbody>
</table>

\[
\text{f} = \text{d} + \text{e}
\]

**Chart 2 Calculation of UPS-to-PDU Feeder Segment of ELC-Step #1**

Revise the equations in the columns shown below. Changes highlighted in yellow.

(Note: Additions are shown in underline and deletions are shown in strikethrough.)

<table>
<thead>
<tr>
<th>% Design Load</th>
<th>UPS Output, kVA 9, 12</th>
<th>PDU Quant. 10</th>
<th>PDU Size, kVA 12</th>
<th>PDU Actual, kVA 10, 12</th>
<th>PDU Input, V</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>444.44</td>
<td>4</td>
<td>150</td>
<td>111.11</td>
<td>480</td>
</tr>
<tr>
<td>75%</td>
<td>333.33</td>
<td>4</td>
<td>150</td>
<td>83.33</td>
<td>480</td>
</tr>
<tr>
<td>50%</td>
<td>222.22</td>
<td>4</td>
<td>150</td>
<td>55.56</td>
<td>480</td>
</tr>
<tr>
<td>25%</td>
<td>111.11</td>
<td>4</td>
<td>150</td>
<td>27.78</td>
<td>480</td>
</tr>
</tbody>
</table>

\[
a = \text{f}
\]
\[
b = \text{i} \\
\]
\[
c = \frac{\text{d}}{\text{e}}
\]
\[
e = \frac{\text{b}}{\text{c}}
\]
\[
f = \text{f}
\]
## Chart 4 Calculation of Branch Circuit Portion of Distribution Segment of ELC – Step # 3

Revise the equations in the columns shown below. Changes highlighted in **yellow**.

*(Note: Additions are shown in *underline* and deletions are shown in *strike-through*.)

### Loss and Efficiency of Worst Case Branch Circuit from PDU Branch Breakers to Cabinets

| %   | 1Ph A | _ A | 18 | A | VA | VA | AWG | ft | 75°C | ohms | I²R, | Per Cond. | Cond., | 1²R Loss | Total Loss | Power Loss | Seg Effic., |
|-----|-------|-----|----|---|----|----|-----|----|------|------|------|------|-------|-------|-----------|------------|------------|-------------|
| 100%| 208   | 30  | 24 | 24| 2882-2496 | 2 | 5764 | #10 | 50   | 1.21 | 0.0605 | 576.00 | 34.85 | 69.70 | 1.24 | 1.40% | 98.79% |
| 75% | 208   | 30  | 24 | 18| 2162-1872 | 2 | 4322 | #10 | 50   | 1.21 | 0.0605 | 324.00 | 19.60 | 39.20 | 0.91 | 1.05% | 99.09% |
| 50% | 208   | 30  | 24 | 12| 1441-1248 | 2 | 2882 | #10 | 50   | 1.21 | 0.0605 | 144.00 | 8.71 | 17.42 | 0.60 | 0.70% | 99.40% |
| 25% | 208   | 30  | 24 | 6 | 721-624  | 2 | 1441 | #10 | 50   | 1.21 | 0.0605 | 36.00  | 2.18 | 4.36 | 0.30 | 0.35% | 99.70% |

### Equations

- \( b = c \times d \)
- \( e = a \times d \)
- \( f = \frac{h \times g}{100} \)
- \( h = f \times g \)
- \( l = k/1000 \)
- \( m = e \)
- \( n = m \times l \)
- \( o = g \times \frac{q}{h} \)
- \( r = 100% - \frac{q}{100} \)

### Notes

- [36x566] Standard 90.4-2022 Errata
- [63x536] Chart 4 Calculation of Branch Circuit Portion of Distribution Segment of ELC – Step # 3
- [105x520] Revise the equations in the columns shown below. Changes highlighted in **yellow**.
- *(Note: Additions are shown in *underline* and deletions are shown in *strike-through*.)
- [74x477] Loss and Efficiency of Worst Case Branch Circuit from PDU Branch Breakers to Cabinets
- [49x408] \( 100\% \)
- [73x381] \( 208 \)
- [110x381] \( 30 \)
- [145x381] \( 24 \)
- [192x381] \( 24 \)
- [240x381] \( 5764 \)
- [261x381] \( 34.85 \)
- [293x381] \( 69.70 \)
- [332x381] \( 1.21 \)
- [375x381] \( 0.0605 \)
- [403x381] \( 576.00 \)
- [453x381] \( 34.85 \)
- [480x381] \( 69.70 \)
### Chart 5 ELC Calculation of Distribution Segment of ELC - Step 4
Revise the equations in the columns shown below. Changes highlighted in yellow.
(Note: Additions are shown in underline and deletions are shown in strikethrough.)

#### Combined UPS, PDU, and Branch Ckt. Efficiencies for Distribution Segment of ELC

<table>
<thead>
<tr>
<th>% Design Load, %</th>
<th>PDU, Feeder, %</th>
<th>PDU, %</th>
<th>Branch Circuit, %</th>
<th>Combined Efficiencies, %</th>
<th>Loss, %</th>
<th>Distrib. Segment of ELC</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>99.41%</td>
<td>97.50%</td>
<td>98.79 98.60%</td>
<td>95.75 95.57%</td>
<td>4.25 4.43%</td>
<td>0.042 0.044</td>
</tr>
<tr>
<td>75%</td>
<td>99.56%</td>
<td>97.80%</td>
<td>99.09 98.95%</td>
<td>96.49 96.35%</td>
<td>3.51 3.65%</td>
<td>0.035 0.037</td>
</tr>
<tr>
<td>50%</td>
<td>99.71%</td>
<td>98.00%</td>
<td>99.40 99.30%</td>
<td>97.42 97.03%</td>
<td>2.88 2.97%</td>
<td>0.029 0.030</td>
</tr>
<tr>
<td>25%</td>
<td>99.85%</td>
<td>98.40%</td>
<td>99.70 99.65%</td>
<td>97.96 97.91%</td>
<td>2.04 2.09%</td>
<td>0.020 0.021</td>
</tr>
</tbody>
</table>

\[ a = b \times c \times d \]
\[ f = 100\% - e \]
\[ g = |f| \]

### Chart 6 ELC Calculation Based on Losses
Revise the equations in the columns shown below. Changes highlighted in yellow.
(Note: Additions are shown in underline and deletions are shown in strikethrough.)

<table>
<thead>
<tr>
<th>% Design Load, %</th>
<th>UPS Segment</th>
<th>ITE Distrib. Segment</th>
<th>ELC</th>
<th>ELC Standard Values</th>
<th>Diff. from Standard</th>
<th>Pass or Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>0.042</td>
<td>0.042 0.044</td>
<td>0.085 0.086</td>
<td>0.110</td>
<td>0.025 0.024</td>
<td>Pass</td>
</tr>
<tr>
<td>75%</td>
<td>0.044</td>
<td>0.035 0.037</td>
<td>0.079 0.080</td>
<td>0.098</td>
<td>0.019 0.018</td>
<td>Pass</td>
</tr>
<tr>
<td>50%</td>
<td>0.042</td>
<td>0.029 0.030</td>
<td>0.070 0.071</td>
<td>0.094</td>
<td>0.024 0.023</td>
<td>Pass</td>
</tr>
<tr>
<td>25%</td>
<td>0.065</td>
<td>0.020 0.021</td>
<td>0.085 0.086</td>
<td>0.093</td>
<td>0.008 0.007</td>
<td>Pass</td>
</tr>
</tbody>
</table>

\[ a = b \times c \times d \]
\[ f = e - d \]
\[ g = |f| \]