May 23, 2019

Re:  Tension Performance of Post-Installed Anchors Adjacent to Abandoned Holes

To Whom It May Concern:

This letter is intended to address the performance of Simpson Strong-Tie® post-installed concrete anchors in normal-weight concrete when installed adjacent to holes that have been abandoned. Examples of abandoned holes include holes that were drilled at an incorrect location, or situations where the anchor location had to be moved after drilling took place.

Simpson Strong-Tie® conducted a series of tension tests on installed anchors in our ISO 17025-accredited anchor testing laboratory, comparing various conditions with and without abandoned holes near the loaded anchors. Testing was performed on various anchor types including drop-in anchors, wedge-type anchors, screw anchors, and adhesive anchors. Nominal anchor diameters of 3/4 in. and smaller were included as part of this test program. The distance between the installed anchor and the abandoned hole(s) was measured as the center of the anchor to the center of the abandoned hole, as shown as distance “L” in Figure 1. The minimum distance “L” examined in these tests was two times the drilled hole diameter, “d.”

Based on the results of this test program, Simpson Strong-Tie® suggests the following guidelines for tension performance of anchors near abandoned holes:

1. Anchors should not be installed closer than 2 times the drilled hole diameter (2d) away from an abandoned hole.

2. Anchors that are more than 2 inches away from abandoned holes do not require a reduction in capacity.

3. Expansion anchors, such as drop-in and wedge-type anchors, that are more than two times the drilled hole diameter (2d), but less than 2 inches from abandoned holes, should have a factor of 0.80 applied to their calculated tension capacity.

4. Concrete screws and adhesive anchors that are more than two times the drilled hole diameter (2d), but less than 2 inches from abandoned holes, should have a factor of 0.90 applied to their calculated tension capacity.

5. Where abandoned holes have been filled with a non-expansive grout or anchoring adhesive and allowed to completely cure, no reduction is necessary for anchors installed more than two times the drilled hole diameter (2d) away from the filled holes.

Table 1: Summary of Capacity Reductions Due to Abandoned Holes

<table>
<thead>
<tr>
<th>Anchor Type</th>
<th>Abandoned Hole Distance</th>
<th>Capacity Adjustment Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Types Tested</td>
<td>L &gt; 2 in.</td>
<td>1.00</td>
</tr>
<tr>
<td>Expansion Anchors</td>
<td>2d ≤ L ≤ 2 in.</td>
<td>0.80</td>
</tr>
<tr>
<td>Concrete Screws and Adhesive Anchors</td>
<td>2d ≤ L ≤ 2 in.</td>
<td>0.90</td>
</tr>
<tr>
<td>All Types Tested, with Abandoned Holes Re-Filled as noted on item 5 above</td>
<td>L ≥ 2d</td>
<td>1.00</td>
</tr>
</tbody>
</table>

The information in this letter is valid until 05/31/2021 when it will be re-evaluated by Simpson Strong-Tie. Please visit strongtie.com for additional pertinent information. If you have questions or need further assistance regarding this matter, please contact the Simpson Strong-Tie engineering department at 800.999.5099.

Sincerely,

SIMPSON STRONG-TIE COMPANY INC.