



CONCRETE AND MASONRY ANCHOR MANUFACTURERS ASSOCIATION

Thomas Associates
Executive Director

January 11, 2021

Mr. Manual Chan, PE, SE
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Reference: Proposed Revisions to the Acceptance Criteria for Expansion Anchors in Masonry Elements,
Subject AC01-0221-R1 (MC/HS)

Dear Mr. Chan,

The Concrete and Masonry Anchor Manufacturer's Association has reviewed the comments submitted by Simpson Strong Tie in their letter of December 16, 2020 on the proposed revisions to AC01. Our responses are provided in the attached table.

We appreciate your attention in this matter. If you have any questions, please do not hesitate to contact us.

Sincerely,

CRAIG H. ADDINGTON

CHA/kb

Cc: H. Silverman, ICC Evaluation Service, LLC
K. McBride, Hilti Corporation
AC01 Task Group

Review of Proposed Revisions to the Acceptance Criteria for Expansion Anchors in Masonry Elements, Subject AC01-0221-R1

| SECTION/LINE | COMMENTS | CAMA response |
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| Section 1.3.10, Line 75 | Change "CI 318-14, -11" to "ACI 318-14, -11". | Agreed. |
| Table 4.3, Test No. 11 | Change batch number from "2" to "1". | Agreed. |
| Section 4.6.3.1.5, Line 1348 | Section is not needed. Information already exists in section 4.6.3.1.3. | Agreed. Delete section 4.6.3.1.5. |
| Table 4.9 | Section 1.2 caps the maximum anchor diameter at 1" (25 mm). Table 4.9 covers drill bit sizes through 2" (52 mm). Shouldn't Table 4.9 be reduced in scope? | Change reference from ANSI B212.15 to ACI 355.2-19 in line 1368. Change title of Table 4.9 to "Required diameters of carbide drill bits for specified hole diameters" |
| Section 6.8.2, Line 1726 | N_k is defined in section 1.6, but what is not clear in this section is if the value of N_k is taken from a reference test (Table 4.1, Test 1a; Table 4.2, Test 1a; Table 4.3, Test 1a; Table 4.4, Test 1b). | Amend line 1726 as follows: "shall be the smaller of $0.6N_k$ or $0.7A_{se}f_y$, <u>whereby N_k shall be derived from the corresponding reference test location for the tested masonry type.</u> " |
| Section 6.9.2.1.1, Line 1825 | $N_{st,mean}$ is not defined in this section or in section 1.6. | Add the definition of $N_{st,mean}$ provided by 355.2-19 to Section 1.5 as follows: $N_{st,mean}$ = average ultimate steel capacity determined from tensile tests on full-sized anchor specimens, lbf (N) |
| Section 6.9.2.1.1, Line 1831 | Change " $f_{m,test,i}$ = measured compressive strength of the grout used for the screw anchor reference test" to " $f_{m,ref}$ = measured compressive strength of the grout used for the screw anchor reference test". | Agreed. |
| Section 6.9.2.1.1, Line 1839 | $N_{u,resid}$ is not defined in this section or in section 1.6. | Add the following definition to Section 1.5: |

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| | | $N_{u,resid}$ = peak residual load measured after conduct of applicable service condition tests, lbf. (N) |
| Section 6.9.2.2.1, Line 1891 | $N_{st,mean}$ is not defined in this section or in section 1.6. | See response to comment on Line 1825. |
| Section 6.9.2.2.1, Line 1897 | Change “ $f_{m,test,i}$ = measured compressive strength of the grout used for the screw anchor reference test” to “ $f_{m,ref}$ = measured compressive strength of the grout used for the screw anchor reference test”. | Agreed. |
| Section 6.9.2.2.1, Line 1905 | $N_{u,resid}$ is not defined in this section or in section 1.6. | Add the following definition to Section 1.5: $N_{u,resid}$ = peak residual load measured after conduct of applicable service condition |
| Section 6.10.3.3, Line 2001 | In (6-1), change “ f_{ut} ” to “ f_{uta} ”. | Replace all instances of f_{ut} with f_{uta} in document. See, for example, lines 391, 2001, 2439, 2447, 2449, 2837 |
| Section 6.10.3.3, Line 2001 | In (6-1), $f_{u,test}$ is not defined in this section or in section 1.6. | Add the definition of $f_{u,test}$ and $F_{u,test}$ provided by 355.2-19 to Section 1.5 as follows: $F_{u,test,i}$ = mean anchor capacity as determined from test series i $f_{u,test}$ = mean ultimate tensile strength of anchor steel as determined by test |
| Line 2174 | Remove one of the words “in”. | See proposed language for Lines 2174-2180 below. |
| Line 2178 | Remove one of the words “in”. | See proposed language for Lines 2174-2180 below. |
| Line 2179 | Remove one of the words “in”. | See proposed language for Lines 2174-2180 below. |

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| Lines 2174 – 2180 | Not sure that the wording in these lines match what is detailed in Tables 4.1 through 4.4 for the seismic test, and the reference test to be used in (7-4). | <p>Tables 4.2 through 4.4 govern. Lines 2174-2180 should follow the tables for</p> <p>$\bar{N}_{o,i}$ = mean tensile capacity from <u>applicable</u> reference service condition tests in in the bed joint (Table 4.2, Test 1e, Table 4.3, Test 1a; Table 4.4, Test 1b) lbf. (N);</p> <p>= ungrouted CMU: mean tensile capacity from Table 4.3 reference test 1b in in the center of cell, lbf. (N);</p> <p>————= brick: mean tensile capacity from Table 4.4 reference test 1c in in the bed joint, lbf. (N);</p> |
| Line 2211 | Change “Equation (7-4)” to “Equation (7-7)”. | Agreed. |

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| <p>Section 7.7.2.2</p> | <p>This section states that testing should be conducted in cracked masonry for anchors evaluated per Table 4.2. However, Table 4.2 Test 15 states the test is conducted in uncracked masonry. What is the correct masonry description for this test?</p> | <p>The test should be conducted in uncracked masonry for Tables 4.1, 4.3, 4.4 and in cracked masonry for Table 4.2. Section 7.7 should be reworded as follows:</p> <p style="text-align: center;">1.1 Static shear testing for single anchors without spacing and edge effects</p> <p>Refer to Table 4.1, Test 13a; Table 4.2, Test 15a; Table 4.3, Test 13; Table 4.4, Test 13.</p> <p>1.1.1 Purpose—This test is performed to evaluate the shear capacity of anchors. <u>For anchors evaluated in accordance with Tables 4.1, 4.3, or 4.4, perform shear tests in uncracked masonry for all anchor diameters at minimum effective embedment h_{ef}. For anchors evaluated in accordance with Table 4.2, perform shear tests in cracked masonry for all anchor diameters at minimum effective embedment h_{ef}.</u> At the option of the manufacturer, additional tests shall be permitted to be performed at deeper embedments.</p> <p>1.1.2 General test conditions</p> <p>1.1.2.1 Perform shear tests in uncracked masonry away from edges in accordance with ASTM C1892.</p> |
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| | | <p>1.1.2.2 Testing location—<u>For anchors evaluated in accordance with Tables 4.1 and 4.3, install anchor in the bed joint and load the anchor parallel to the bed joint. For anchors evaluated in accordance with Table 4.2, shear tests shall be performed in cracked masonry with a crack width of 0.012 in. (0.3 mm) with the load applied parallel to the crack bed joint. For anchors evaluated in accordance with Table 4.4, install anchor in the hollow portion of the brick and load the anchor perpendicular to the bed joint.</u></p> |
| Section 7.8.3, Line 2251 | Change “shear load applied parallel to the crack ...” to “ shear load applied parallel to the bed joint ...”. | Agreed. Adopt language as proposed by commenter. |

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| Lines 2256 -2261 | The wording here only addresses grouted CMU. The wording does not address ungrouted CMU and brick masonry. SUGGESTION: Change lines 2256 – 2261 to read “For grouted CMU, following completion of the simulated seismic shear cycles, open the crack to a width not less than the crack opening width as measured at the end of the cyclic shear test and load the anchor parallel to the crack in shear to failure. Record the maximum shear load or residual capacity and the corresponding displacement and plot the load-displacement response.” Add additional language for ungrouted CMU and brick masonry as follows: “For ungrouted CMU and brick masonry, following completion of the simulated seismic shear cycles, load the anchor parallel to the bed joint in shear to failure. Record the maximum shear load or residual capacity and the corresponding displacement and plot the load-displacement response”. | Agreed. Adopt language as proposed by commenter. | | | | |
| Lines 2717 – 2722 | Formatting issue – Replace the numbers 3 & 4 with a & b. | Agreed. | | | | |
| Lines 2724 - 2743 | Formatting issue – Replace the numbers 5 & 6 with a & b. | Agreed. | | | | |
| Line 2817 | “concrete type” and “concrete compressive strength” need to be replaced with “masonry type” and “masonry compressive strength”. | Agreed. | | | | |
| Table 10.1 | The table addresses min. edge distance, but is this for the distance to the head joint or to the edge of the wall for top of wall installations? | <p>Add new line in the table for $c_{min,top}$ and distinguish between field and top of wall as follows:</p> <table border="1" data-bbox="1276 992 1793 1062"> <tr> <td data-bbox="1276 992 1661 1029">Minimum <u>field-of-wall</u> edge distance</td> <td data-bbox="1661 992 1793 1029">c_{min}</td> </tr> <tr> <td data-bbox="1276 1029 1661 1062">Minimum <u>top-of-wall</u> edge distance</td> <td data-bbox="1661 1029 1793 1062">$c_{min,top}$</td> </tr> </table> | Minimum <u>field-of-wall</u> edge distance | c_{min} | Minimum <u>top-of-wall</u> edge distance | $c_{min,top}$ |
| Minimum <u>field-of-wall</u> edge distance | c_{min} | | | | | |
| Minimum <u>top-of-wall</u> edge distance | $c_{min,top}$ | | | | | |
| Line 219 (1.4.18.4) | During TG meeting: Duplicate definition | Delete duplicate definition 1.4.18.4 starting on line 219. | | | | |