

Minutes
ACI Committee 355
Anchorage to Concrete
October 24, 2004
San Francisco, CA
San Francisco Hilton

Call to Order: The meeting was called to order at 8:30 AM by Chairman Ron Cook. A quorum was declared present (18) with 20 of the 27 voting members present during the meeting.

All members and guests in attendance were self-introduced. Attendees are listed at the end of these minutes. The chairman requested that those present sign the attendance sheet and members check the roster for correctness.

Agenda: The agenda was approved.

Minutes of Last Meeting: The Washington DC March 14, 2004 meeting minutes were approved unanimously as written.

Resolution of comments on the September 11, 2004 ballot on Response to Public Comments (Closure Statement):

The first negative from Kevin Heinert was changed to abstain, at Kevin's request.

As part of a discussion of anchor failures in cracked concrete, the Committee was reminded that Committee Secretary Wollmershauser is keeping a file of any information related to cracked concrete and anchors. The Committee asked if this file material could be made available on the ACI website. This is to be checked.

Discussion was held on the second negative from Kevin Heinert. The issue of large anchors, 2 in. in diameter and deeper than 25 in. was questioned as to whether they should be evaluated the same as smaller anchors. The N_b term may be $\pm 10\%$, but the A_{No} term may influence by 70%. A motion to find Kevin Heinert's second negative related and non-persuasive was approved by a vote of 14-yes, 2-no, and 2-abstain.

A motion to find the negative from Peter Carrato related and non-persuasive was approved by a vote of 14-yes, 2-no, and 3-abstain. Comments included, "Large structures cost more, failures cost more, must be sure of the anchors."

The editorial comments were reviewed. Robert McGlohn withdrew his editorial comment concerning horizontal reinforcing. It will be sent to the editorial task group. A motion to accept the chairman's recommendations as modified (McGlohn's comment) was approved by a vote of 19-yes, 0-no, and 0-abstain.

Remaining 355.2 ballot items from previous ballots:

A task group chaired by Lee Mattis with members Wollmershauser, Eligehausen, La Vine, Carrato, and McGlohn and with Cook consultant to the group was appointed to review the remaining proposed changes and bring a ballot forward before the next meeting in April 2005 to resolve remaining negatives and to ballot further changes to some of the items.

Report from ACI 349 Subcommittee 3:

Branko Galunic, Chairman of Subcommittee 3 of ACI 349 gave a report on the activities of his subcommittee. The subcommittee has prepared 14 revised problem examples to illustrate the revised code. One is an extensive and detailed base plate example. The issue of base plate stiffness is being considered.

Committee E 702 meets Monday at 5:00 pm to work on materials to help engineers design for real-world situations. Attendance was requested since the design examples relate directly to E 702 Committee activities.

ACI 318 proposed revisions to Appendix D resulting from public comments:

Ron Cook gave an update on the status of Appendix D changes.

Bret Turley submitted an extensive list of comments during the public comment period. Several were incorporated and several will be taken up as new business.

D.5.2.2 – coordination of f_c , k_{uncr} , and k_{cr} need corrections to new additions to Appendix D.

Shear toward edge in thin slabs: A change as a result of public comments was proposed. This was proposed as a new factor:

$$\psi_{h,v} = \sqrt{\frac{1.5c_1}{h}} \geq 1.0$$

Don Meinheit proposed a new pryout strength (paper presented at this convention). This will be taken up as new business by ACI 318.

Presentations:

1. Nam-Ho Lee presented further information from the Korean Nuclear testing by KOPEC, KEPRI & KHNP – Behavior of Large Sized Anchors in Concrete. Both the tension presentation and the shear presentation are posted on the ACI Committee website
2. Neal Anderson (and Don Meinheit) presented WJE testing of CIP anchors for pryout away from edges. The presentation is posted on the ACI Committee website.
3. Bill Kepler, Bureau of Reclamation Materials Lab presented a project they are investigating. They are looking at large anchors embedded in dams for decades to support spillway gates. No one knows the condition of these anchors. They have diameters greater than 3 in. and lengths greater than 10 ft. Want to develop a 2nd party evaluation program. Let Bill Kepler know if you can help.
4. Bruce Ireland reported that they are involved in a project to investigate dowels in concrete slabs with fiber reinforcement. It can boost anchor capacity as well as benefiting having deflection benefits. They will have meaningful results in about 1 year.
5. Derrick Watkins of Bechtel and Jake Olsen of CEL presented additional information on the cracked concrete anchor testing, including comparison of results and costs for the WTP test program, vitrification of nuclear waste. The code used was ACI 349-01 to give the required design parameters, k , and ψ_3 factor. Tests were performed on the Drillco MaxiBolt and the Liebig Safety Bolt in cracked concrete. These were the lowest cost, technically acceptable anchors. Tests 1, 3, 10, 11, and 12 of ACI 35.2 Table 5.2 were performed. Costs for the MaxiBolt tests were \$103,000 and for the Liebig, \$55,000. Extrapolated to the full ACI 35.2 test program, estimates were \$212,000 for $n = 5$. The presentation is posted on the ACI Committee website.

Don Meinheit is to develop a study to include a database to look at costs with the idea to reduce the required tests and costs.

6. Rolf Eligehausen presented the latest information on bonded anchors including the design method proposals. This includes the uniform bond stress model for single anchors. Behavior of bonded anchors is more complex than mechanical anchors. Changes in failure modes for groups from pullout to concrete breakout are included. The presentation is posted on the ACI Committee website.

Unfinished business:

1. Design Examples: Robert McGlohn to chair a task group including Sam Eskildsen, Werner Fuchs, and Rich Klingner to develop a ballot before the spring 2005 ACI convention.

New Business:

1. An Editorial task group was established to look at ACI 355.2. Chair is Brett Turley, with members including Don Meinheit, Chris La Vine and Richard Wollmershauser.
2. ACI seminar on anchorage to concrete: ACI 318 is putting on a seminar for ACI 318-05. An additional ½ day could be devoted to Appendix D to include Appendix D design method, background, and examples. The overall seminar would be 1-1/2 days.
3. A bonded anchor product approval standard was discussed. It was agreed that ACI 355 should prepare a companion standard to ACI 355.2, but for bonded and grouted anchors. A draft currently exists as part of the CAMA efforts. This draft will be transcribed to ACI format and balloted this winter. The test methods will be balloted within ASTM E06.13 Subcommittee, *Performance of Connections in Construction*. When the test methods are established in ASTM standards, they will then be stripped out of the ACI standard, leaving the requirements and evaluation methods.

Task group chair is Richard Wollmershauser, with members Tony Lamanna, Rolf Eligehausen, John Silva, Harry Wiewel, Chris la Vine, and Lee Mattis.

4. A joint ACI/ASCE/AISC task group was discussed. Ron Cook will discuss with the TAC contact to determine whether participation is appropriate
5. The spring meeting was proposed to be on Sunday April 17, 2005 from 8:30 am to 4:30 pm. A Monday April 18 task group session is scheduled from 1:00 pm to 5:00 pm.
6. It was announced that the October ACI Structural Journal contains two technical articles by Richard Klingner and Herman Graves.

The meeting was adjourned at 5:25 pm.

Respectfully submitted,
Richard E. Wollmershauser
Secretary

Voting Members present: R. Bandyopadhyah, R. Cook, R. Eligehausen, S. Eskildsen, B. Galunic, B. Gerber, K. Heinert, C. Heinz, B. Ireland, R. Klingner, C. La Vine, A. Lamanna, N-H. Lee, L. Mattis, R. McGlohn, D. Meinheit, R. Orr, P. Sullivan, H. Weiwei, and R. Wollmershauser (20).

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Associate Committee Members present: N. Anderson, W. Fuchs, R. McGrath, J. Pearson, A. Price, J. Silva, and M. Ziegler (7)

Guests present: O. Abhat, A. Adediran, B. Kepler, S-Y. Kim, C. MacDonald, J. Olsen, P. Pusill-Wachsmuth, Y-P. Suh, P. Troiani, D. Ward, and D. Watkins 11)