

ACI 318 Sub A – General Concrete and Construction
[ACI 318 Chapters 1, 2, 3 (excluding 3.5), 4, 5, 6, and 22]

Cincinnati Meeting
Tuesday, 18 October 2011, 1:30 PM to 6:30 PM, Meeting Room C 238

DRAFT AGENDA

1. Call to order at 1:00 pm.
2. Introductions and Membership changes.

Eric Tolles has resigned from 318.
Mark Cunningham has declined joining Sub A.
3. Approval of Agenda.
4. Approval of Minutes:

Tampa meeting, 5 April 2011.

Denver meeting, 20 July 2011
5. Old Business:

5.1. Review of Sub A Ballot A03-2011 (closed 3 May 2011.) Ballot results were sent via email on 6 May 11. This ballot covered Sub A responses to the 318 LB on Chapter 22. There was one substantive change to the chapter as a result of this ballot. Sub A comments were adopted and the 318 negative voters were contacted to withdraw negatives. All but seven items were resolved. These remaining seven items were on 318 LB 11-4. All remaining issues were resolved during the Denver meeting and Chapter 22 was adopted. No further actions are required.

5.2. Review of Sub A Ballot A04-2011 (closed 3 Jun 2011.) Ballot results were sent via email on 8 Jun 2011. This ballot covered four items as shown below. No further actions are required.

Ballot Item	Description	Outcome
1	Responses to 318 LB 10-3, Chapter 24, Second half of comments	Item passed. Comments have been furnished to the Chapter 223 Task Group to evaluate. See discussion of Chapter 223 below.
2	CA 088, Change regarding zinc and epoxy coated bars.	Item passed. However, there were four negatives that probably would have been found persuasive. Item has been included in possible new work list for Chapter 5 Task Group.
3	CA 113, Combination of definitions from other change proposals.	Item passed. Item has been made available to the Task Groups for Chapters 5 and 22 for use as appropriate.
4	CA 026, Deletion of detailed statistical information.	Item passed. This item was discussed during the Denver meeting and all comments were resolved. CA 026 was forwarded to 318 and appeared on

	318 LB 11-5. This ballot is discussed below.
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5.3. Review of Sub A Ballot A05-2011 (closed 8 Jul 2011.) Ballot results were sent via email with the agenda for the Denver meeting on 11 Jul 11. This ballot covered CA 104, the changes to the C and F exposure class discussions. This item was discussed during the Denver meeting and all issues were resolved. A revised version of CA 104 was on Ballot A06-2011, discussed below. No further actions are required.

5.4. Review of Sub A Ballot A06-2011 (closed 29 Aug 2011.) Ballot results were sent via email on 31 August 11. This ballot covered the revised version of CA 104. There were 19 comments to be resolved on this item. The Task Group on CA 104 (Hooton, Weiss, and Kosmatka) will lead the discussion to wrap up this ballot item. A copy of the ballot results and comments is **attached**.

5.5. Review of 318 LB 11-5 (closed 6 Sep 2011.) Ballot results were sent via email on 12 Sep 11. This ballot included CA 026. There were 27 comments including 9 negatives. The Chapter 22 Task Group was asked to review the comments and prepare Sub A responses. The Task Group will lead the discussion on this item. Our objective will be to determine whether we can resolve this item on the 318 floor or whether it will have to be rebaloted. A copy of the ballot results and comments is **attached**

5.6. Summary of all CA items. An updated list of all CA items as of before the Cincinnati meeting is **attached**. Please review and continue to work on the items assigned to you. Note that we currently have 19 active items of which 8 have been approved by Sub A. As indicated on the listing, a number of these items have been assigned to the Task Groups for Chapters 5 and 22 to consider as new business.

5.7. CA Items resolved since the last meeting:

- CA 044, Use of “nor”, resolved during reorganization.
- CA 086, Definition of Lambda, definition transferred to CA 113.
- CA 087, Density values for lightweight concrete, definition transferred to CA 113.
- CA 094, Add equation numbers to table, resolved during reorganization.
- CA 095, Editorial clarification, resolved during reorganization.
- CA 096, Editorial clarification, resolved during reorganization.
- CA 107, Add sustainability comments, transferred to Sub R/Sub H
- CA 108, Clarify requirements for F3, rolled into CA 104
- CA 109, Revise definition for admixtures, definition transferred to CA 113.

5.8 Resolution of two CA items.

CA 083, Referencing “code-like” documents in 318. This is a Chapter 1 issue. Because Sub A is no longer responsible for Chapter 1, recommend dropping this item.

CA 098, Clarification of an issue regarding proportioning. This is a Chapter 22 issue. Because passage of CA 026 appears to be achievable, this item is no longer necessary. Recommend dropping this item.

5.9. Code reorganization.

5.9.1. Task Groups for Code Reorganization. Following are the current Task Groups. Eric Tolles been removed from Chapter 22 Task Group. Need to make a transfer here. Florian and Dean will be reassigned once Chapter 23 is merged into Chapter 24.

- Chapter 5, Material Properties and Durability. **Tony, CH**, Fred, Doug
- Chapter 22, Concrete Materials and Quality Assurance, **Nick, CH**, Ken B., **need additional member**
- Chapter 23, Formwork, **Florian, CH**, Dean
- Chapter 24, Contract Documents and Construction, **Colin, CH**, Steve, Ken H., Harry, Jason

5.9.2. Current Status:

Chapter 5: This chapter has been adopted. Chapter Task Group will present plan for going forward on this chapter.

Chapter 22. This chapter has been adopted. Chapter Task Group will present plan for going forward on this chapter.

Chapter 23. Chapter 23 was completed and discussed in Denver. This chapter will be combined with Chapter 24 to form a single chapter, which will be Chapter 23.

It was agreed in Denver to accomplish two tasks to move Chapter 23 forward:

1. The Chapter Task Group will review the huge number of 318 and Sub A comments to determine which are substantive and should be addressed.
2. The Chapter will be reorganized to make the flow more logical and to try to make the chapter amenable to breaking down to various subcommittees for future upkeep because many of the topics are outside of Sub A's jurisdiction.

Terry and Colin will report on the progress on this chapter.

5.9.3 Process for moving forward. The following step-by-step process for working with the reorganized document was discussed and adopted. No changes from what was presented in Pittsburgh.

Approach for Sub A to go Forward

1. 318 Letter Ballot
2. Comments to Sub A Task Group – Return a single set of comments ready for Sub A ballot
3. Sub A Letter Ballot on Proposed Responses

Achieve Consensus

4. Prepare revised chapter (Terry, Greg, and Staff editors)
5. Sub A Letter Ballot on Revised Chapter

Achieve Consensus

6. Return chapter to 318 for next Letter Ballot

5.10. Use of 4 x 8 inch cylinders. Rachel Detwiler sent Sub A a copy of a paper that she has prepared. Mike Bartlett has also provided comments on this paper. Colin Lobo also provided additional information on this topic. The committee agreed that we would like to see data from additional labs before making any changes to the requirement for testing three 4 x 8 in. cylinders. Harry Gleich reported that the precast industry has converted to testing only two cylinders. Colin Lobo will forward additional test data. The committee agreed to reopen this item. Steve Kosmatka and Colin Lobo were appointed to summarize current data and to prepare a new ballot item for consideration. This item is assigned CA 105. **Steve and Colin will update references in CA 105 and send for a Sub A ballot. Status?**

5.11. Performance specifications and implications for 318. Topic remains open for possible action during this code cycle.

5.12. Exposure class conflicts. A possible conflict between Classes F3 and C2 was brought up during the St. Louis meeting.

This issue is being addressed in CA 104. No further action required here. Drop from next agenda.

5.13. Adding alkali-silica reactivity (ASR) to the Code. Of all of the major durability issues with concrete, only ASR is not addressed in the Code. After discussion, a Task Group of Folliard, Hooton, and Fiorato was formed to review this issue and make a recommendation to the committee during the meeting in New Orleans. In Chicago, Tony reported that ASTM C09 is preparing a specification for dealing with ASR. Sub A agreed to put any action on hold until that document is completed. It was agreed that it is still premature for Sub A to take any action here. This item will remain on the agenda until action is taken.

5.14. Determining Lambda. Carino had the following comment on Sub A Ballot A02-09:

I have some questions about the splitting tensile strength. First, f_{ct} is defined as the average splitting tensile strength, so this is not a function of f'_c , but a function of the average compressive strength of the concrete. So it is not correct to say that f_{ct} is $6.7 \sqrt{f'_c}$. Second, I'd like an explanation of how an engineer would determine lambda for the second alternative. The code language is not clear. I think the f_{ct} in the equation should be measured average splitting tensile strength. Maybe Fred or Ken can explain to us how the equation in 8.6.1 is supposed to be used to choose lambda.

It was agreed that the Code needs cleaning up here. Fred will follow up with ACI 213 and prepare a CA item. Note that CA 111 was assigned here. Status?

5.15. Definitions of Exposure Classes F1, F2, and F3. A Code user sent the following email to Basile:

ACI 318-08 Table 4.3.1 for each exposure class F1, F2 and F3 the maximum w/cm is 0.45 and the minimum concrete strength is 4500 psi. The commentary indicates that F1 and F2 are conditions where exposure to deicing salts is not anticipated.

ACI 201.2R-01 Section 1.4.2 Water-cement ratio. For concrete exposed to deicing salts maximum w/cm ratio is 0.45 and all other structures maximum w/cm ratio is 0.50.

Can you verify that the values in ACI 318 table 4.3.1 are what ACI 318 intended? I would think that freezing and thawing exposure going from "moderate, F1" to "severe, F2" to "very severe, F3" that the maximum w/cm ratio and minimum concrete strength would vary.

We build vertical slip formed concrete structures (grain storage type structures), ACI 313-91 required a minimum compressive strength of 3000 psi, ACI 313-97 requires a minimum compressive strength of 4000 psi and now it appears that ACI 318-08 is requiring 4500 psi concrete for exposure conditions F1 and F2. ACI 318-08 commentary indicates that F1 is for exterior walls not in direct contact with soil and F2 is for vertical members in contact with soil.

This issue is being addressed in CA 104. No further action required here. Drop from next agenda.

5.14. Sulfate resistance: The following email was sent to Cathy French. Colin Lobo responded as shown.

I hope your sabbatical is going well. I had a question for you when
> you have a minute. On our wind farm projects in some parts of the
> country we are running into situations where we have severe sulfate
> exposures and it seems that I am continually at odds with local
> concrete suppliers over the interpretation of the sulfate resistance

- > portions of chapter 4 of ACI 318. Is this one of your fields of
- > expertise or can you recommend someone I could talk to so I can make
- > sure I am doing the right thing?
- >
- >
- >
- > The issue that I keep running into is that, the way I read section
- > 4.3, for severe sulfate exposures, type V cement is required. Type I
- > or II cement with the addition of class F fly ash can be used if the
- > mixture meets the requirements of section 4.5 when tested according to

- > ASTM C1012. The problem is that the test takes 6 months or a year to
- > run and I have yet to run into a concrete supplier who has run it on
- > any of their mixes. The suppliers that I talk to want to offer me a
- > test result from ASTM C452 but I have found multiple references in the

- > literature to the fact that this test is not accurate for mixes
- > containing cement blended with pozzolans. I have continued to insist
- > that the C1012 test be run if anything is to be substituted for the
- > type V cement but I seem to be the only engineer that these suppliers
- > are running into that is requiring them to do this.

Colin Lobo:

I will attempt a response. The sulfate provisions in the code are not ideal for compliance in practice.

In the footnote to table 4.3.1 "The amount of the specific source of the pozzolan or slag to be used shall not be less than the amount that has been determined by service record..."

This note permits the LDP to use customary practice on mix composition in lieu of test. It is realized the test duration is too long for mix submittals. It is unlikely that concrete suppliers will have C1012 data. It is more likely that blended cements by C595 or C1157 will have data in their certifications, but S3 requires additional SCM. In CA for instance the use of 25% fly ash in addition to a sulfate resistant cement has been considered adequate for severe sulfate conditions. I think it is accepted by CALTRANS. I am not sure of the area of your projects, but slag as an SCM might be an option too. Slag has been entering the CA market more recently and these suppliers (as with the fly ash people) might have C1012 data but it wont be with the specific cement for the project. What is important in the cement would be the C3A used in the test relative to that used on the project. If that on the project is equal to or less than that used in the test, it should be OK.

ASTM C 452 is not an appropriate test - it is an optional test to qualify Portland cements for sulfate resistance only.

You might consult with Eric Tolles who is a code official for the city of Irvine in CA (if that's where you are operating). Eric is on 318 and aware of these provisions.

Does Sub A need to take action here? This item was not discussed in New Orleans, Chicago, Pittsburgh, Tampa, or Denver because of a lack of time. Status?

6. New Business:

Note that the following new business items are listed by title only because we will probably not have time to address them. If time is available or if a topic is of interest to a member, we will address these items.

- 6.1. Core waiting period.
- 6.2. Add recycled aggregate to the Code.
- 6.3. Top bar effects in self-consolidating concrete.
- 6.4. Fix mixture proportioning flow chart in Commentary.

This will be moot if CA 026 is adopted.

- 6.5. Various new work items resulting from review of Version 1 of the reorganized Code.

These items are being incorporated into the possible new work lists as chapters are adopted.

- 6.6. w/cm versus strength for durability.
- 6.7. Chloride ion restrictions in concrete containing aluminum embedments.
- 6.8. Request to add ASTM C 1600 Rapid hardening Hydraulic Cements to the Code.
- 6.9. Inquiry regarding appropriate strength for w/cm for durability.
- 6.10. Ward Malish issues regarding brackish water.

Note: None of these items have been addressed because of lack of time.

7. Adjourn



Committee 318-0A Web Letter Ballots

Closed Ballot

(Record of original votes as of closing date)

Ballot Title/ID: A06-2011
Description: CA 104 - C, F, and P Exposure Class and Requirements Changes
Attached File (Optional): [A06-2011 Comment Form](#)
Project:
Start Date: 8/8/2011
End Date: 8/29/2011

Ballot Items:

Item #	Item Description
1	CA 104 Attached File: 2011-08-08 - CA 104

[Download all ballot description + item description files as zip file](#)

Voting Members:

Item #	Member	Aff.	Aff. w/ Com.	Neg.	Abs.	Not Retd.	Comments	Attached Files	
1	Barth, Florian					X			
	Bondy, Kenneth	X							
	Browning, Dean	X							
	Carino, Nicholas			X			See attached file.	Comment	
	Fiorato, Anthony		X				Suggest changing the title to: "Subject: Proposed Changes to Exposure Class Designations and Requirements in Chapter 5"		
	Gleich, Harry			X			my concerns is how do we define critically saturated and there are causes where deicing salts are used that will fall under F1.		
	Holland, Terence	X							
	Hooton, R Doug	X							
	Hover, Kenneth	X							
	Kosmatka, Steven	X							
	Lobo, Colin	X							
	Meyer, Fred		X					- On Line 125, Exposure Category "P" should be "W" - On line 130, "P1" should be "W1"	
	Tolles, Eric						X		
	Weiss, W Jason	X							

[Download vote and comment files as zip file \(Attachments ONLY - Typed in comments cannot be downloaded\)](#)

Preliminary Voting Summary:

There are 14 committee members eligible to vote.

Passage of an item requires resolution of any negative votes. Passage of an item also requires that the number of affirmative votes be at least that given by the 1/2 and 2/3 rules. Please refer to the ACI Technical Committee Manual for additional information on balloting procedures.

Item #	Affirmative	Affirmative with Comments	Negative	Abstain	Not Returned	The 1/2 Rule	The 2/3 Rule
1	8	2	2		2	Item Meets	Item Meets

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No.	Name	Pg #	Line #	Y/C or N	Comment
1.	Carino	1		N	The Rationale could stand some technical and editorial improvement. See the marked up version attached after this table.
2.	Carino	0	0		My page numbering begins with page 1 being the rationale. So the start of the Code change is page 3.
3.	Carino	3	3	Y/C	The line numbers for the Table refer to the “rows”. Remove period after “cycles.”
4.	Carino	3	4	N	I think we need to restore “freezing and thawing” as part of the exposure description: <u>Concrete exposed to freezing and thawing and to moisture but not likely to be critically saturated during freezing-and-thawing cycles</u>
5.	Carino	3	5	N	I think we need to restore “freezing and thawing” as part of the exposure description: <u>Concrete exposed to freezing and thawing and to moisture with the potential to be of being critically saturated during freezing-and-thawing cycles</u>
6.	Carino	3	6	N	I think we need to restore “freezing and thawing” as part of the exposure description: <u>Concrete exposed to freezing and thawing, moisture, and deicing chemicals with the potential to be of being critically saturated during freezing-and-thawing cycles.</u>
7.	Carino	3	7	Y/C	For consistency with the other description, revise to: <u>Members Concrete that is dry in service or in contact with moisture or water where and low permeability is not required</u>
8.	Carino	3	8	Y/C	For consistency with the other description, revise to: <u>Members Concrete in contact with water where and low permeability is required</u>
9.	Carino	4	98	N	We need introduce "complete saturation." Revise as follows: <u>In concrete that is not air-entrained, damage caused by freezing and thawing occurs when there is sufficient water in the pores to result in expansive cracking stresses upon freezing. This moisture condition is known as critical saturation. Due to the 9% expansion of water when it freezes, critical saturation of a single pore is 91.7% of complete saturation [Powers 1975]. However, in concrete due to different sizes of pores and locations from the surface, values for critical saturation of concrete are lower and can vary from approximately 75 to 90% of complete saturation [Hover 2006].</u>
10.	Carino	5	109	Y/C	Change “moist” to “moisture”.
11.	Carino	5	118	N	Do not use “should”. Revise as follows: <u>Table R4.2.1 provides examples of concrete members for each of these exposure classes. If a portion of a foundation wall exposed to freezing can be in a critically saturated condition, the assigned Exposure Class is F2; but if it is also exposed to de-icing chemicals, the assigned Exposure Class is F3.</u>
12.	Carino	5	122	Y/C	Can we use “structural member” instead of “walls, columns...slabs”?
13.	Carino	6	125	N	Do not use “should”. Revise as follows: Exposure Category W is subdivided into two exposure Classes: Structural members should be assigned to Exposure Class W0 if they are dry in service, exposed to moisture or in contact with water but there are no specific requirements for low permeability requirements. Exposure Class W1 is assigned if there is need for concrete with low permeability to water when the permeation of water through concrete might reduce durability or affect the intended function of the structural member. Exposure Class W1 is typically assigned when other exposure classes do not apply.

No.	Name	Pg #	Line #	Y/C or N	Comment
14.		7	160	Y/C	Revise as follows: Hover, K.C., 2006. "Air Content and Density of Hardened Concrete," Chapter 26 in Significance of Tests and Properties of Concrete and Concrete Making Materials , ASTM STP169D, J. Lamond and J. Pielert, Eds, pp. 288-308. Powers, T.C., 1975. "Freezing Effects in Concrete," Durability of Concrete , ACI SP-47, pp. 1-11.
15.	Fiorato	0	0	Y/C	Suggest changing the title to: "Subject: Proposed Changes to Exposure Class Designations and Requirements in Chapter 5"
16.	Gleich	0	0	N	my concerns is how do we define critically saturated and there are causes where deicing salts are used that will fall under F1.
17.	Meyer	6	125	Y/C	Exposure Category "P" should be "W"
18.	Meyer	6	130	Y/C	"P1" should be "W1"
19.	Outside reviewer			N/A	Comments to be considered – See pdf email following this file.

Editorial Changes to the Rationale.

Note that code references are to the locked-down version of Chapter 5 (318-201X). Commentary references are to 318-08. Proper section numbers will be provided when the complete Commentary for Chapter 5 is prepared.

Code section: Tables 5.3.1 and 5.3.2 and associated Commentary

Basis: A possible conflict between the requirements for Exposure Classes F3 and C2 was discussed during the St. Louis ACI meeting in 2008. In addition, a number of complaints have been received from 318 users that the definitions of freezing exposure classes are not clear and that, in some instances, the requirements are overly conservative. Possible confusion over including permeability as an exposure category was raised by a Sub A member.

Reason for change: To clarify descriptions and requirements for concrete in Exposure Category F. To ensure that requirements for Exposure Categories F and C are compatible. To replace the term “Not Applicable” with “Benign,” which was brought up on a 318 LB. To clarify that permeability is not an exposure condition.

Background:

A. In Table 5.3.1, the description of Exposure Classes F3 mentions exposure to moisture and deicing chemicals and the description for Exposure Class C2 mentions exposure to external source of chlorides including deicing chemicals and a wet environment. Concretes in these two exposure classes, however, have to meet different requirements as given in Table 5.3.2. Even though R4.3.1 discusses the issue of selecting the more restrictive requirement, having different requirements for exposures to deicing chemicals can lead to confusion. Parking structures are the main types of structures where the more restrictive C2 concrete requirements should apply for an F3 exposure because corrosion of reinforcement is the primary concern. F3 also has limitations on the SCM content in concrete because deicer scaling is an additional concern, mainly for flatwork. The limits on SCM content are not intended for concrete assigned to exposure Class C2.

In Table 5.3.1, Exposure Classes F3 and C2 mention deicing chemicals as follows:

F3: *“Concrete exposed to freezing-and thawing and in continuous contact with moisture and exposed to deicing chemicals.”*

C2: *“Concrete exposed to moisture and an external source of chlorides from deicing chemicals, salt, brackish water, seawater, or spray from these sources.”*

But in Table 5.3.2, the requirements for concrete in Exposure Class F3 and Exposure Class C2 are different, which are paraphrased as follows:

F3: Must have $w/cm \leq 0.45$, a specified strength of at least 4500 psi, be air-entrained (to meet Table 5.3.3.1), and not have more SCMs than listed in Table 5.3.3.2.

C2: Must have $w/cm \leq 0.40$ and a specified strength of at least 5000 psi. There is no requirement for air entrainment because concretes might not be exposed to freezing, but there is a limit on chlorides in the concrete mixture, and more than the normal cover depth is required.

Currently, Section 5.3.2 states, *“Based on the exposure classes assigned from Table 5.3.1, concrete mixtures shall comply with the most restrictive requirements according to Table 5.3.2.”*

Based upon the above discussion, the LDP may have difficulties in interpreting this clause.

B. Code users have complained that the definitions of Exposure Classes within Category F are not clear and the requirements are overly conservative in some instances. Exposure Class F1 is intended to apply to members that will be exposed to freezing and moisture but are not anticipated to be in a critically saturated condition when freezing occurs, such as foundation walls or external walls and columns. The current requirements for F1 are too restrictive and should be relaxed. Reducing the minimum specified strength from 4500 psi to 3500 psi is consistent with the recommendations of both ACI 201.2R and with Canadian Standard CSA A23.1, which has proven to be adequate in Canadian climates. The current descriptions of Exposure Classes F2 and F3 include the words “in continuous contact with moisture.” These descriptions are ambiguous and imprecise. The real concern is whether there is a possibility that a portion of a member will be in a critically saturated condition when freezing occurs. Thus it would be more precise -if the descriptions were changed to include the words “the potential to be in a critically saturated condition,” provided that the meaning of "critically saturated" is explained in the Commentary. Likewise, for Exposure Class F1, “occasional exposure tp moisture” would be better stated as “not likely to be critically saturated”. In addition, it would be helpful in the Commentary included examples of the exposure classes that should be assigned to different types of members.

C. Exposure category P was developed for ACI 318-08 based on a provision in Table 4.2.2 in 318-05 for an “exposure condition” described as “Concrete intended to have low permeability when exposed to water.” Permeability is a material property and not a durability exposure condition. Thus it is proposed that the exposure category be renamed to “Water (W)” for concrete members in contact with water that require low permeability. There are no changes to the requirements.

D. It is proposed to replace the term “Not applicable” with the term “Benign” as an exposure severity designation. In addition to making the change for Exposure Class F0, as shown in this ballot, this would also be done for S0 and C0.

Subject: RE: ACI 318, Freezing and Thawing

From: "Doc Moyle" <DocM@arwengineers.com>

Date: 22-Aug-11 11:27

To: "Terence C. Holland" <terry@concreteterry.com>

CC: "Satyendra K. Ghosh" <skghoshinc@gmail.com>, "Jim Harris" <Jim.Harris@jrharrisandco.com>, "Dave Pierson" <davep@arwengineers.com>

Terry,

Sorry it has taken so long to comment on this. My schedule has not been my own for the past few weeks . . .

Thanks, also, for sending this to me. I have appreciated this exchange over the past few months.

I am at a bit of a disadvantage, not having access to the newer research that is referenced in the proposed revision. However, as I see it, there are a few items in the proposed revision that may be a point of conflict when put into practical use.

1. There still appears to be no provisions for dealing with completely buried concrete elements (such as footings or foundation walls) that may be above the frost-line. The ACI apparently would indicate that anything above the frost-line will need to be classified as F1 and if it is in "continuous contact with soil" (as indicated in the new commentary table) it could be misinterpreted that all footings or buried elements above the frost-line will need to be classified as F2. Our experience here in Utah is that we are in a relatively dry climate, with lots of freeze/thaw cycles. We have typically specified 3,000 psi concrete without air-entrainment for buried footings and some foundation walls above the frost line with absolutely no issues or problems with durability or serviceability due to freeze/thaw cycles. We attribute this to the fact that the elements are buried and are partly protected by the thermal mass of the surrounding soil. As such, we've theorized that these elements will be exposed to significantly less freeze/thaw cycles over the life of the structure than exposed elements. I don't see anything in the proposed revision that addresses this. It is interesting to note that concrete strength and air for footings in the CSA (Exposure Class N) are allowed to be based on "For Structural Design". However, the ACI still hasn't addressed these elements and would tend to be overly conservative by comparative interpretation.
2. In the "reasons for the change", it addresses the specific issue of foundation walls and some of the confusion with the current provisions (see lines 51-55 in the proposed revision). However, in the actual proposed revision, the confusion is still created by including, as an example of F2 concrete, "members in contact with soil". Therefore, this could still be interpreted as meaning that concrete foundation walls, tilt-up wall panels that extend below the soil, exterior columns, etc. would need to be at least F2, when in reality, they could be F1 if not critically saturated. In my reading and interpretation of ACI 201.2R, the recommendations for elements with "Moderate Exposure" was for flat slab elements that are in direct contact with soil, not vertical elements. I realize that the commentary is just that, commentary. However, code reviewers in our state have taken this commentary as gospel and have held engineering designs to this higher standard even though it isn't actual code. In actual practice, all foundation elements below grade are typically coated with a water-proofing membrane. Therefore, the only exposed portion would be above grade. And, technically, the concrete wouldn't necessarily be in direct contact with soil anyway . . . Your thoughts???
3. The definition of "critically saturated" is an improvement, but is still left open to interpretation and personal judgment. Maybe this is why you've included concrete that is in contact with soil as F2 . . . ??

Ultimately, we would hope that completely buried elements could be classified as F0 and that vertical elements in contact with soil, but not in a critically saturated state when subject to freeze thaw cycles could be classified as F1.

Because of this, I would recommend that the revision include, at a minimum, the following two items:

1. Provisions for structural elements (footings, grade-beams, foundation walls, etc.) that are completely

buried in soil. My recommendation would be to allow these elements to be classified as F0 and specifically include them in the commentary as an example of F0 concrete.

2. Modify the example of F2 concrete to exclude concrete foundation walls, columns, tilt-up wall panels, etc. that are in contact with soil, but may not be in a critically saturated condition during freeze/thaw cycles. This will allow them to be classified as F1, if possible.

I hope my comments make sense. Again, thanks for this exchange and for considering these requests.

Respectfully,



From: Terence C. Holland [mailto:terry@concreteterry.com]
Sent: Monday, August 22, 2011 6:27 AM
To: Doc Moyle
Subject: Fwd: ACI 318, Freezing and Thawing

Doc:

I never received a response on this email. I did get an "out of office" reply when sent.

You have been very prompt on all of the others.

Last chance to comment.

Terry

----- Original Message -----

Subject: ACI 318, Freezing and Thawing
Date: Mon, 01 Aug 2011 09:46:19 -0400
From: Terence C. Holland <terry@concreteterry.com>
To: Doc Moyle <DocM@arwengineers.com>

Doc:

Attached is the most current version of the change proposal. We spent a lot of time on this at our Denver meeting. I think we have about got it correct and better for the user.

This has to go through another Sub A ballot and then it will go for a 318 ballot, probably in September.

Any comments will be appreciated.

Regards,

Terry

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Sorted Comments for ACI 318 Ballot LB11-5

As of September 7, 2011

Last Name	Submittal #	Line #	Vote: Y C* N** A	Comments
Cook	CA026	0	N	ACI 301 is only referenced in current Chapter 18 and that is in the commentary for prestressed. The 318 Code needs to give the statistical requirements for f'c either directly or by a Code reference. If only 22.5 (old 5.6) is given then all that has to be achieved is that f'c be the average compressive strength of three cylinders. I thought with our strength design code that f'c was to be a lower bound of what we could expect to have in the structure and not a mean value. It would be very helpful to have ACI 301 available for review when reconsidering this ballot item.
Jirsa	CA026	0	Y	Commentary will be helpful in fully evaluating this change.
Moehle	CA026	0	C	This seems an unnecessary change at this time, one that will distract from other important business. My preference is to keep this harmless material in place until ACI 318 has adequate time to consider the effects of its removal.
Wood	CA026	0	Y	Strongly support the deletion of this material.
Wyllie	CA026	0	N	I vote No on this proposed change. I agree other ACI documents cover mix designs, but I believe it is important to keep them in the code. Designers and Building Officials read the code but not those other documents. It is necessary to keep this information in the code as it governs concrete strength, acceptance criteria and testing. This is where the Design Engineer needs to read it.
Rabbat	CA026	10	C	Need only the first sentence. Move the balance of text under "Background."
Parra	CA026	49	C	I believe "Provides" should be deleted.
Rogowsky	CA026	49	C	Consider deleting "and cohesive". These words do not appear to add any useful meaning.
Frosch	CA026	50	C	Consider replacing "worked" with "placed". The existing language uses "workable" in line 49 and "worked" in line 50 which is awkward.
Wood	CA026	50	C	In the phrase "... permit concrete to be worked readily into forms...", is "worked" the correct verb? It seems to be awkwardly worded.
Parra	CA026	53	C	Add "Concrete" at the beginning of section. Same in line 54.
Corley	CA026	59	N	Keep old wording. This could be interpreted that entirely different materials such as river gravel rather than crushed stone could be used in same proportions. I don't think this is what is intended.
Corley	CA026	60	N	Keep old wording.
Corley	CA026	70	N	I will change to Yes if reference is made in code to ACI 301

				and/or other ACI publications.
Dolan	CA026	190	C	I approve the change but I am a bit concerned about the use of the word performance. Often the mixture is accepted based on cylinder tests. If that is the basis, there is little to evaluate performance for environmental exposure etc. I think the word performance can be removed without changing either the intent or substance of the code. Performance can remain in line 201
Becker	CA026	191	N	I strongly object to a code requirement that the LDP review any kind of concrete mix records prior to construction. Most engineers write performance specifications. Reviewing a record for a mix places a performance assurance burden on the LDP. Delete the first sentence. There will then be no change to the intent of the provision.
Parra	CA026	191	C	Capitalize "Licensed Design Professional". Same in lines 199 and 205.
Rabbat	CA026	191	N	There is no definition of "performance records" in the code. Please specify in the code criteria that define performance.
Frosch	CA026	194	C	Suggest delete "data" after "field".... "based on field or laboratory data."
Kelly	CA026	195	C	Consider changing "similar" be changed to "equivalent".
Frosch	CA026	197	C	Suggest changing "on" to "during"
Frosch	CA026	198	C	Use symbols. Reword "and $f'_c \leq 5000$ psi, ..."
Rabbat	CA026	198	C	Delete comma from 5000 in Lines 198 and 200.
Becker	CA026	199	N	I strongly object to a code requirement that the LDP review any kind of concrete mix records prior to construction. Most engineers write performance specifications. Reviewing a record for a mix places a performance assurance burden on the LDP. Suggest modifying the first sentence as "If field or laboratory data are not available and f'_c is less than or equal to 5000 psi, the licensed design professional shall review proposed concrete mixtures on the basis of other experience shall be permitted. or information provided. "
Frosch	CA026	200	C	Use symbols. Reword "If $f'_c > 5000$ psi, ..."
Becker	CA026	205	N	I strongly object to the LDP being required to determine acceptability of evidence. With a performance specification, the supplier takes on the responsibility of performance.
Anderson	CA026	213	C	Clearly, we will need to reference the alternate means and documents where this deleted information is contained in the commentary (ACI committee reports, etc.)

SUMMARY OF SUB A ITEMS -- BEFORE CINCINNATI MEETING

	Total Sub A items	47	
	Last CA Number Assigned	CA 113	
SOURCES	Carryover from 2008 Code cycle	16	
	Added from public 2008 comments	11	
	Added during this Code cycle	20	
	Total	47	
RESOLVED	Adopted, 2011 Code	6	
	Not adopted, 2011/2014 Code	22	
	Adopted, 2014 Code	0	
	Active items	19	
	Total	47	

ACTIVE ITEMS

NUMBER	DESCRIPTION	RESPONSIBLE	COMMENTS
CA 002	Curing issues, 5.6.4.1 and 5.11. New Chapter 22	Hover	See comments for CA 026. This item will be kept open until the results of CA 026 are known
CA 026	Rewrite of Chapter 22, strength issues	Ch 22 TG	Has passed Sub A. Was on 318 LB11-5, did not pass. Will discuss in Cincy.
CA 056	Harmonize chloride limits. New Chapter 5	Weiss	On hold, coordinate with ACI 201 and ACI 222
CA 065	Maximum size of aggregate between reinf and forms. New 22.3.2.1	Holland, CH 22 TG	Passed Sub A. Th CH 22 TG to consider.
CA 069	Incorporate certified inspectors into the Code. New Chapter 22.	Holland and Carino	Sub A ballot 10-2006, DNP. Holland to update and ballot.
CA 070	Cementitious materials for chlorides. New Chapter 5.	Lobo/Weiss	On hold, coordinate with ACI 201 and ACI 222
CA 077	Rewrite Ch 5, construction issues. New Chapter 23.	Hover	Sub A ballot A01-2009, DNP, revise and rebalot. Will be addressed once CH 23 is available.
CA 083	2008 Code, PC 5, Hanskat. 1.1.5, review references to all ACI codes and code-like documents. New Chapter 1.	Holland	Basis material has been supplied. Discuss in Cincy, recommend dropping.
CA 088	2008 Code, PC 38, Gustafson 318 ballot comment. Table R.4.3.1, second sentence below table. Delete sentence regarding epoxy and zinc coated bars. New Chapter 5.	Hooton, CH 5 TG	Was on Sub A A04-2011, did not pass Sub A. To CH 5 TG to consider.
CA 092	2008 Code, PC 69, Cunningham. 2.2 and 5.6.2.4, add definition of strength test to Ch. 2. New Chapters 2 and 22.	Carino	Passed Sub A -- Need to combine with CA 099 for 318 ballot. Holland to combine and pass to CH 22 TG

CA 093	2008 Code, PC 414, Green. R8.6.1, give justification for interpolation in values of lamda. New Chapter 5.	Bondy/Meyer, CH 5 TG	Passed Sub A. To CH 5 TG to consider.
CA 098	Clarify application of 5.5. New Chapter 22.	Carino	Hold for resolutiopn of CA 026. Discuss in Cincy, drop?
CA 099	Clarify use of term f'c, various locations. New Chaapter 22.	Fiorato	Passed Sub A -- Need to combine with CA 092 for 318 ballot. Holland to combine and pass to CH 22 TG
CA 101	Clarify requirements regarding measuring air. New Chapter 5.	Hover, CH 5 TG	Passed Sub A. To CH 5 TG to consider.
CA 103	Add "and roofs" to 6.4.4 (misc Item #3) New Chapter 23	Holland	Passed Sub A. Will be addressed once CH 23 is available.
CA 104	Remove Exposure Cat. "Permeability" from Ch. 4; misc edits to Ch. 4 (misc item # 4); includes clarification of Cats C and F. New Chapter 5.	Lobo/Hooton	On Sub A ballot A06-2011, did not pass. Discuss in Cincy
CA 105	Number of 4x8 inch cylinders required. New Chapter 22.	Kosmatka	Assigned at San Antonio meeting. Waiting on additional documentation
CA 111	Additional lamda issues -- can lamda be defined on basis of unit weight? New chapter 5 and elsewhere.	Meyer	Assigned in Pittsburgh. Meyer is working on this.
CA 113	Combination of several definitions. Various locations.	CH 5 TG. CH 22 TG	All have passed Sub A. To CH 5 and CH 22 TG to c0nsider