AGENDA

ACI 308B Curing Concrete–Specification Sub-Committee

Wednesday, March 24 - 8a-10:30a

Chicago Sheraton Suite 929

1.01 Introductions

1.02 Approval of Fall Minutes

1.02.1 Committee Responses to Public Comments, Attached

1.03 Old Business
Completion of committee Responses to Public Comments, Attached

1.04 Adjournment

Document: ACI 308.1: Title "Specification for Curing Concrete"
Public Discussion Period: August 1 – September 17, 2009

No.	Public Commenter Name	Pg #	Line #	Public Comment	Committee Response
1.	Stone, Richard W.	2	17 - 19	Consider replacing "construction" with "concrete" so as to agree with other ACI documents; consider deleting "insulating concrete" because that usually refers to concrete having low thermal conductivity; use as thermal insulation	Agreed – Change to cold weather "concreting"
2.	Lee, Douglas	4	11	The caption of 1.4 must be "Submittals" to be consistent with that in the text.	Agreed – Change title in table of content to "Submittals"
3.	Lee, Douglas	4	12	The caption of 1.5 must be "Quality assurance" to be consistent with that in the text.	Agreed – Change to "Quality assurance"
10.	Stone, Richard W.	8	21-Feb	Many of these definitions are at variance to 116R. Consider deleting those that are already in 116R, or revising to be the same.	No Action Needed
11.	Rooke, Wally	8, 9	23, 1	Note nomograph 2.1.5 in ACI 305 demonstrates that if both concrete and air is warm, evaporation rate will not be high. If % humidity and wind remain the same, the wider the difference in temperature between air and concrete, the higher the evaporation rate. If concrete were cool/cold and the air hot, one could actually get condensation on the concrete, just like on your beer glass.	No Action Needed
12.	Stone, Richard W.	9	2, 8, 10	Many of these definitions are at variance to 116R. Consider deleting those that are already in 116R, or revising to be the same. Note also that definitions of "owner" and "permitted" may be at variance to those utilized elsewhere in any set of Contract Documents.	No Action Needed
13.	Lee, Douglas	9	23	The minimum of 7 days before execution of the work is not sufficient. Especially for the case that The Architect/Engineer finds some or all of the submittals are not acceptable after review and must return them to the Contractor, the 7-day minimum would be woefully inadequate. This commenter would like to suggest the 14-day minimum.	No Action Needed

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14.	Stone, Richard W.	9	23	Consider making this optional. 7 days may be at variance to other parts of a Contract. Consider adding notice to Specifier to review and adjust so as to agree with requirements elsewhere.	No Action Needed
15.	Stone, Richard W.	11, 21		Some curing compounds are water based and have limitations on ambient temperature for use. Consider adding language to alert specifier.	No Action Needed
16.	Stone, Richard W.	11	8-Feb	This is covered in 301. May not be necessary to repeat here?	No Action Needed
17.	Moody, Greg	11	3	"Tests of concrete shall be made by an ACI Concrete Field Technician, Grade 1 or equivalent." tacitly indicates that a technician with ACI Concrete Field Technician, Grade 1 certification is qualified to perform all required testing, including strength determination in the laboratory. May I recommend "Field tests of concrete shall be made by an ACI Concrete Field Technician, Grade 1 or equivalent."	Agreed- add "Field" tests of concrete...
18.	Stone, Richard W.	11	14 - 22	There are some popular products that are not film-forming (309, 1315)---consider making comment regarding this.	No Action Needed
19.	Moats, Harry	11	17	White pigmented cure should be specified at dissipating white pigmented curing compound.	No Action Needed
20.	Donovan, Tim	11	18	Clarify: "...specified or permitted" by whom.	No Action Needed
21.	Scaglione, Nick	11	22	Add warning about not working the evaporation retardant into the surface during subsequent finishing operations	No Action Needed
22.	Jenkins, Robert	12	16 - 17	Move the opening parenthesis to before "40.7". Correct "sqyd^{2}" to yd^2 and "sqm^{2}" to m^2.	Agree- See item no. 27 response to Ward Malish comments
23.	Jenkins, Robert	12	17 - 18	Remove the sentence "Fogging equipment.....80μm)." There is no standard test to measure the droplet size and therefore this requirement cannot be enforced.	Agreed- Revise sentence as noted
24.	Moats, Harry	12	8	All water can cause deterioration of reinforcing steel in the by rusting the steel. This seems to be a contradiction.	No Action Needed

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25.	Stone, Richard W.	12	9	The 20 degree cooler requirement may be very costly and difficult to attain. Most water curing is accomplished using well or municipal water that is about 55 degrees. On a hot day, flatwork may be quite warm. While this has been a recommendation in 308R for quite some time, it is difficult to attain. Consider alerting specifiers to this as a potential item to adjust or delete.	Addressed in item no. 26
26.	Ward R. Malisch	12	9	The 20F limit on difference in temperature of the cooling water and concrete surface is not based on adequate data. The references in ACI 308R-01 that support limiting the temperature difference are Kosmatka and Panarese (1987) and Mather (1987). Kosmatka and Panarese suggest the 20F limit only for **ponded** curing water. In his 1987 paper, Mather cites a 1971 article on the Abu Simel project in Egypt, in which the anonymous author **hypothesizes** that "...the use of water leads to severe superficial cooling, resulting from the marked evaporation due to strong winds, which introduces a steep temperature gradient in the fresh concrete and **may** increase the risk of surface cracking." This latter statement doesn't mention the temperature of the curing water, but refers to evaporative cooling as the problem. Nor does the anonymous author define a "steep temperature gradient." Another statement in ACI 308R-01, "A sudden drop in concrete temperature of about 11 C (20 F) can produce a strain of about 100 millionths, which approximates the typical strain capacity of concrete," cites no references and gives no clue as to the conditions under which the strain of 100 millionths	Agree-Move language about temperature limit from section 2.2 (Water Application) to section 2.2.1 (Ponding)
27.	Ward R. Malisch	12	15	Does sufficient velocity mean high enough velocity to control the concrete surface area covered? Based on my experience with a garden hose, higher velocity produces a more tightly focused stream that covers less area. Why not just say "Equipment shall produce a fog spray from atomizing nozzles that will cover the concrete surface?"	Agree-Editorially change to suggested language
28.	Browne, Adam	12	16	There appears to be a typographical error in that the 40.7 should be inside the parenthesis for the metric units.	Agree-See item no. 27

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29.	Donovan, Tim	12	16	Change 40.7 (L/h/sqm2) to (40.7 L/h/sqm2).	Agree-See item no. 27
30.	Haddad, Gilbert	12	16	Move round bracket to precede 40.7	Agree-See item no. 27
31.	Rooke, Wally	12	16	Metric conversion poor; should be 40/l/h/m3; also, editorially, both dimensions should delete "sq" in front of yd & m;	Agree-See item no. 27
32.	Scaglione, Nick	12	16	"sqyd^{2}" should be either sqyd or yd^{2}	Agree-See item no. 27
33.	Scaglione, Nick	12	17	"sqm^{2}" should be either sqm or m^{2}	Agree-See item no. 27
34.	Browne, Adam	12	18	There appears to be a typographical error in a missing space in "80□m" which should be "80 μm"	Agree-See item no. 23
35.	Ward R. Malisch	12	19	How do you determine if the rate of fogging is such that evaporation of water from the concrete surface is prevented? Using the nomograph gives an evaporation rate that can change with changes in wind velocity, concrete temperature, and ambient temperature and relative humidity. Does that mean that rate of fogging has to be adjusted based on periodic measurements of the parameters mentioned? A better statement would say that the rate of fogging shall prevent surface drying and the accumulation of standing water on the surface. Both of those conditions are visually evident.	Agree-Add a period after the word "prevented" on line 19, and then add the following sentence: "The rate of fogging shall prevent surface drying and the accumulation of standing water on the surface."

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36.	Haddad, Gilbert	12	22	In my opinion, use of the words "absorbent materials" is inappropriate because it implies that they are materials which absorb water and one could falsely understand that they would absorb water from the surface of the concrete upon which they are deposited. I would favor calling them "wetting materials", however, if the Committee wishes to retain the words "absorbent materials", it should be specifically mentioned that the materials be completely pre-soaked before being deposited upon the concrete surface, and that they be kept permanently in a soaked condition throughout the curing period. I suppose that sand and earth are still used in very particular cases. However, I question if the use of straw or hay is not archaic, and if they do retain curing water adequately. Burlap is covered by AASHTO M182, but cotton mats and rugs are not covered by any standard I know of. In Canada, we use geotextiles extensively, particularly for high performance concrete. I feel that geotextiles should be included among the materials.	Aggreed to take up as new business
37.	Moats, Harry	12	22	Most of these items will stain concrete so why list them?	No Action Needed
41.	Ward R. Malisch	13	9	Humidity maintained "at or near 100%" is vague and unenforceable. Is 90% close enough? 75%? Once again, a better requirement would be: Maintain the humidity above the slab at a level to prevent surface drying and the accumulation of standing water on the surface.	Agree-Revise to reflect language suggested
43.	Ward R. Malisch	13	15 - 16	The first sentence is not clear. I suspect some needed words have been omitted. But if it is cleared up, I think it will say evaporation retardants can be used to trap bleed water. But concrete can have so little mixing water due to use of water-reducing admixtures that no bleeding occurs. Will the use of evaporation retardants be suitable for initial curing under these conditions?	Agree-Delete the words "Use entrapment of the" and replace with "Entrap any..."

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44.	Ward R. Malisch	13	16 - 17	What are the different floating operations? I can see applying the retardant after bullfloating and before hand or power floating. Also between multiple floating passes. But are finishers not permitted to apply the retardant after the final floating pass but before troweling starts? Need clarification here	Remove "subsequent" on line 18; On line 16, after the second use of the word "retardant", add "after strike off and "
47.	Ward R. Malisch	13	17 - 18	If finishers have applied an evaporation retardant before troweling, how do they avoid working it into the paste during troweling? Eliminate mention of the evaporation retardant and just say don't work free water into the surface.	Addressed previously
49.	Malisch, Ward R.	15	4	How is "time of initial setting" determined by the inspector or the worker using soaker hoses? How about "Use soaker hose... after water will not damage the surface and before form removal."	Agree-Use verbiage suggested
50.	Ward R. Malisch	14	5	Change "prevent" to "minimize." Sheets still allow some moisture to pass through.	No Action Needed
54.	Malisch, Ward R.	15	10	Humidity maintained "at or near 100%" is vague and unenforceable. Is 90% close enough? 75%? Once again, a better requirement would be: Maintain the humidity above the slab at a level to prevent surface drying and the accumulation of standing water on the surface	Agree-Add comment from item no. 41
56.	Ward R. Malisch	14	14-Dec	If the compound is applied immediately after final finishing, unless final finishing refers to bullfloating, there should be no visible free water or water sheen. Also, is there a way to tell when "bleeding has essentially ceased?" If so, it should be explained. For instance, "...bleeding has essentially ceased as evidenced by ..."	Agree-Place a period after the word "bleeding" on line 13 and delete the remainder of the sentence.
57.	Ward R. Malisch	14	14 - 15	What is "adequate ventilation" and how is the contractor to provide it? What is the reason for this requirement?	Agree-Change "formation" on line 17 to "application"
76.	Ward R. Malisch	18	12-Nov	What condition defines "when loss of moisture can't be controlled...?	No Action Needed

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78.	Ward R. Malisch	18	4	How do the workers determine when "evaporation rates may be high?" You are leaving a lot to worker or inspector judgment. Also on this line, the phrase "initial set" is used. Does this mean initial set determined objectively by a test or initial set determined subjectively?	Agree-Replace "may" on line 4 with "are expected to be high." Delete the remainder of the sentence.
79.	Ward R. Malisch	18	7	What condition defines "when necessary to prevent rapid water loss and drying of the concrete surface?" Suggest "When previous placements have resulted in plastic shrinkage cracking, ..."	No Action Needed
81.	Ward R. Malisch	21	12-Nov	Both "hot weather" and "high evaporation" should be defined.	No Action Needed
83.	Ward R. Malisch	22	19 - 21	This should not be in the Optional Requirements Checklist" because it is specified in the main text and thus is not optional.	Agree-Delete from checklist
88.	Ward R. Malisch	23		Item 3.5.1 says "active winds." What defines winds as active?	Agree-Delete the word "active"
89.	Ward R. Malisch	24	4	Replace "to avoid" with "to minimize." Can't always avoid this.	Agree-Use suggested verbiage
91.	Ward R. Malisch	25		1.4.2, 3.1, 3.2, and 3.6 last line. It's "evaporation retardants"	Agree-Use consistent verbiage
95.	Ward R. Malisch	26	3	How is "quality of water" defined?	No Action Needed

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4.	Lee, Douglas	4	13	Remove (No such section in the text.)	
5.	Lee, Douglas	4	14	Remove (No such section in the text.)	
6.	Lee, Douglas	4	15	Remove (No such section in the text.)	
7.	Donovan, Tim	5	17	Change "surface" to "surfaces".	
8.	Donovan, Tim	6	5	Add reference for "Hot Weather Concreting".	
9.	Haddad, Gilbert	6	9	Correct name of standard.	
38.	Cunningham, Mark	13	7	The "i" in "immediately" is shown as bold font.	
39.	Donovan, Tim	13	7	The "i" for "immediately" should not be Bold.	
40.	Haddad, Gilbert	13	9	I believe that "relative humidity" is the correct term to use	
42.	Moats, Harry	13	10-Sep	Not sure how you can fog a surface and keep 100% humidity just above the surface without adding to the moisture to the surface.	
45.	Moats, Harry	13	16 - 18	Not sure how you can apply the evaporation retardant between the different floating operations without working into the paste during subsequent toweling operations.	
46.	Taylor, Peter	13	17	If it is not permitted to work the evaporation retardant back into the paste – how else will it be removed? This statement effectively bans their use. I thought this was the whole benefit of these materials in that they could be worked back in with little effect on the concrete.	
48.	Haddad, Gilbert	14	1	Add the word "them" between "keep" and "wet".	
51.	Haddad, Gilbert	14	9	Add the word "curing" after "membrane-forming"	

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52.	Browne, Adam	14	10-Sep	The specification says not to use the liquid membrane "at a rate not greater than...." I would have thought the specification would say "at a rate not less than...." However, neither ASTM C 309 nor AASHTO M 148 specify a rate of application in the field, only a rate for testing purposes (see 4.1.2). Please clarify.	
53.	Haddad, Gilbert	15	10	Say "relative humidity"	
55.	Haddad, Gilbert	14	12	Replace "liquid membrane-forming" by "curing". For the sake of consistency with the beginning of article 3.2.2.2	
58.	Taylor, Peter	15	15	"Do not stain the concrete" is tough to enforce. At the extreme - if a stain is part of the architect's plan then we have a problem. All of the instructions given in the clause work to this end but this blanket ban on staining (even if it is on a surface that no-one sees?) imposes burdens on the contractor that will escalate costs. I have seen staining from use of plastic sheeting but this is not addressed in 3.2.1.	
59.	Matteson, Craig L.	15	15 - 16	"Do not stain the concrete." Should this be more defined, it can be a very broad statement.	
60.	Matteson, Craig L.	15	21	Only a typo, the metric temp was not in brackets, as the rest of the temperatures were shown in the document.	
61.	Rooke, Wally	15	21	50F (10C) is very high to be considered "cold" weather; suggest 40F (4C) as used in Canadian Standard A23.1. Canada knows cold! Also, why is metric dimension here given editorial priority?	
62.	Browne, Adam	15 16	23 2-Jan	A third option for termination of curing may be relevant: curing until 70% of the *Basis of Proportioning strength used for approval*	

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63.	Haddad, Gilbert	16	9	In some countries such as Canada, standard 4"x8" cylinders are normally used for compression testing. However, 6"x12" cylinders are preferably used for field-cured cylinders because they relate better to the curing condition of the structural members they intend to represent. Consequently, I suggest that the appropriate cylinder size of 6"x12" be specifically mentioned.	
64.	Browne, Adam	16	14 - 15	Using instrumentation to ensure a satisfactory level of internal relative humidity may be relevant to ensure the method of curing is effective. Whereas this instrumentation is fairly new, they are becoming higher in quality, less expensive, and more accessible.	
65.	Cunningham, Mark	17	9-Aug	If saturated concrete, or concrete exposed to moisture, is not air entrained, it shouldn't be exposed to freeze/thaw cycles.	
66.	Cunningham, Mark	17	9	What if the design compressive strength is less than 4000 psi, e.g. for a (non-structural) slab-on-grade.	
67.	Donovan, Tim	17	12	Insulating blankets should be considered as an option.	
68.	Scaglione, Nick	17	13	"...Section 2 or..." The or should be "and" The concrete cannot just be heated, it needs to be cured and heated.	
69.	Cunningham, Mark	17	16 - 22	3.5.6 should be deleted because 3.5.5 already refers to 306.1 which specifies the maximum cooling permitted in 24-hours after removal of protection (and which is actually different for section less than 12 inches).	
70.	Haddad, Gilbert	17	19	The °F indicated are not instantaneous temperatures, but rather number of degrees F. Consequently, the corresponding degrees C should be corrected to 31°C, 22°C, 17°C, and 11°C respectively. Page 18, line 13 : correct he sentence to read: such as placing and finishing concrete at night or postponing or delaying placement until conditions are...	
71.	Kenny, Amit	17	19	Since it is temperature change, it should be 30.5˚C	

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72.	Rooke, Wally	17	19 - 22	Why no metric equivalents for dimensions? Suggest 300 mm/300 mm -1 m/1-2 m/ & Greater than 2 m as practical equivalents	
73.	Kenny, Amit	17	20	Since it is temperature change, it should be 22°C	
74.	Kenny, Amit	17	21	Since it is temperature change, it should be 16.5°C	
75.	Kenny, Amit	17	22	Since it is temperature change, it should be 11°C	
77.	Taylor, Peter	18	1	Do we not need a requirement in the Hot Weather section to address effects of cold fronts (ie rapid cooling) on slabs on grade?	
80.	Stone, Richard W.	21	10-Jun	This is the most critical aspect of the checklist. Different methods and procedures for curing may be necessary for flatwork than are required for foundations, walls, columns, etc. Consider adding language to this effect.	
82.	Rooke, Wally	21	3-Nov	The phrasing implies that hot weather (only) induces a high evaporation rate whereas in truth warm/hot concrete on a cold day induces even higher evaporation rates. (See evaporation nomograph in Figure 2.1.5 in ACI 305R. What month of the year is evaporation highest from Lake Ontario? January because of the wide difference between water and air temperatures in winter	
84.	Cunningham, Mark	22	22	2.2.1 is ponding whereas notes refer to sheeting. Should section reference be 2.1.3 instead?	
85.	Cunningham, Mark	23		Third box from top: 3.3.2.2, 3.3.2.3, and 3.3.2.4 don't exist in document.	
86.	Cunningham, Mark	23		Fourth box from top: 3.3.2.2 doesn't exist within document.	
87.	Scaglione, Nick	23		There are no sections 3.3.2.2, 3.3.2.3 or 3.3.2.4 referenced in the third box down and the fourth box down	
90.	Cunningham, Mark	25		Fifth box from top: 2.3 doesn't exist within document.	

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92.	Stone, Richard W.	25	8, 11	Consider making this optional. 1 month may be at variance to other parts of a Contract. Consider adding notice to Specifier to review and adjust so as to agree with requirements elsewhere.	
93.	Scaglione, Nick	26		There is no section 3.3.2.2 referenced in the second box down	
94.	Cunningham, Mark	26	2	Partially repeats preceding box on page 25 as both indicate: "Submit description of curing procedure to be used,"	
96.	Cunningham, Mark	26	4	3.3.2.2 doesn't exist within document. Should this be 3.3.2.1?	