

Contractors & Producers: We CAN Get Along!

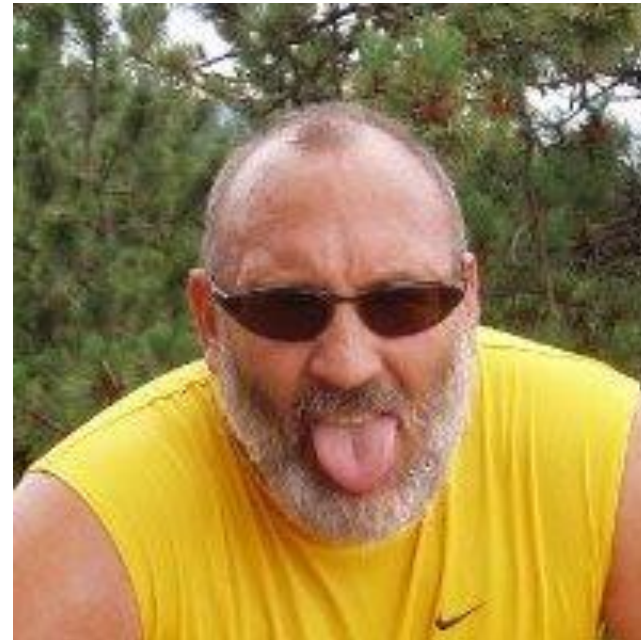
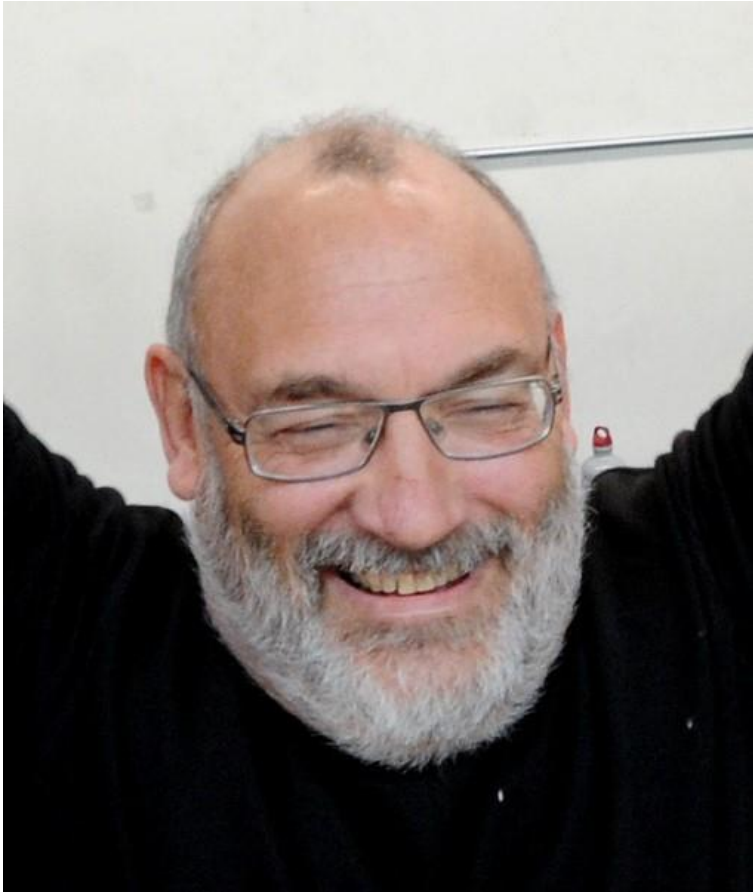
Colin Lobo, NRMCA

March 2023

THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE



Understanding BS



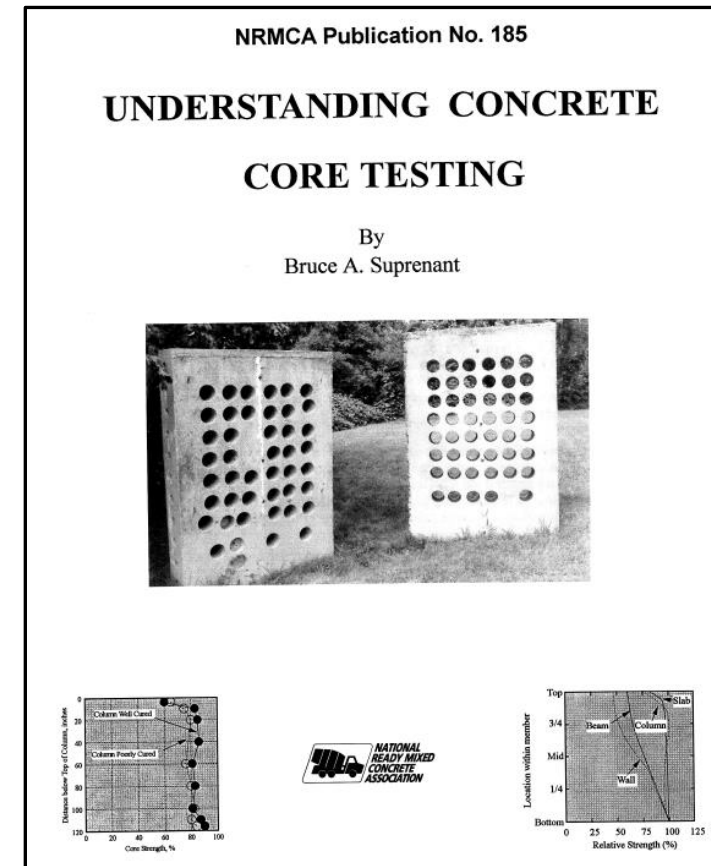
THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

aci CONCRETE
CONVENTION



A First Interaction

- ACI Requirements for Cores
 - Why 3 cores
 - Erratic core?
 - Equivalent f'_c ?
- Strength variation of in-place concrete
 - Cores vs. cylinders
 - Core location
- Factors Affecting Core Strength
 - Drilling
 - Wet vs. dry
 - Length-to-diameter; size effect...



P2P Initiative

Performance-Based Specifications

An Initiative for Change

Robert A. Garbini, PE
President
NRMCA

Performance Based Specification (Ideal)

- Engineer writes specification with performance criteria
- Producer develops mixture with own expertise
- Producer chooses level of risk
 - Plant capabilities
 - Past history and confidence level
 - Job conditions / contractor / testing lab
- Accommodate certain prescriptive provisions, e.g., chloride limits, air content, corrosion inhibitors, etc.
- Submittal states that mixture meets specification requirements
 - Company proprietary information retained
- Submittal could be certified by an independent professional engineer

P2P What it's NOT

- ✓ It is not an attempt to remove the engineer's input into the concrete
 - ✓ Just the opposite - by focusing the discussion on performance rather than composition, a more complete discussion of all the performance needs will ensue, leading to better quality and economy
- ✓ It is not an attempt to hide vital information
 - ✓ Materials contained in the mixture and their individual certifications will be provided
 - ✓ Information needed for yield determination and job-site adjustment will be provided

What Can We Agree On!

- Producer Responsibility
 - Setting characteristics
 - Slump
 - Air content
- Contractor Responsibility
 - Testing frequency / location
 - Jobsite Adjustments
 - Delivery rate
 - Pumping
 - ...


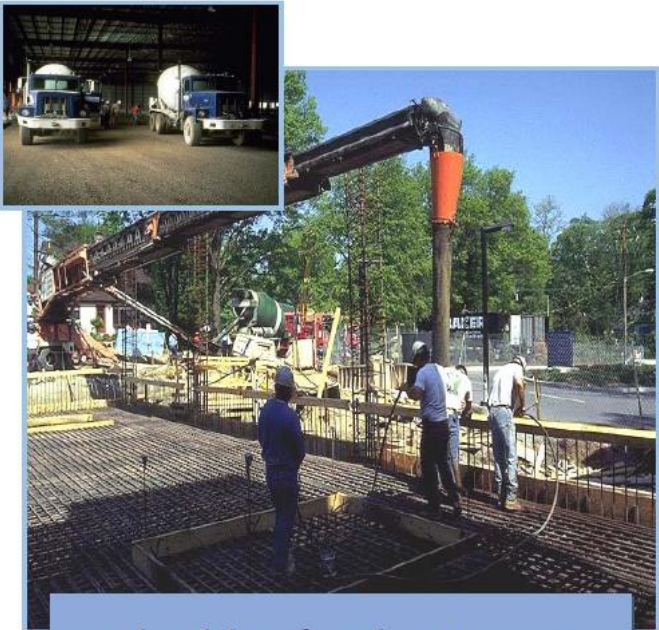
ASCC and NRMCA

Checklist for Concrete Producer- Concrete Contractor Fresh Concrete Performance Expectations


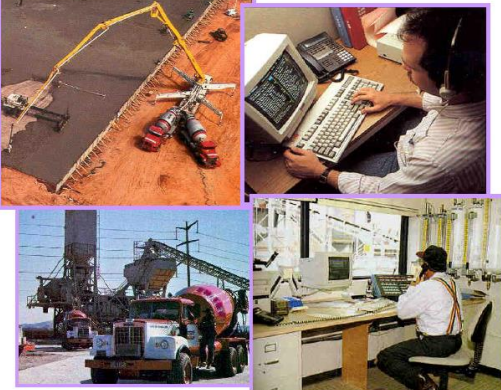
Prescription to Performance (P2P) Initiative



Preconstruction Checklists

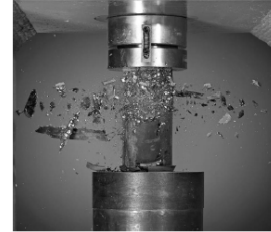
Checklist for the Concrete Pre-Construction Conference

Checklist for Ordering and Scheduling Ready Mixed Concrete[®]




CHECKLIST FOR PUMPING READY MIXED CONCRETE[®]

PRE-CONSTRUCTION CHECKLIST
Concrete Acceptance Testing

Pre-construction meetings are important to plan concrete construction work before the start of a project to avoid potential problems. This pre-construction checklist specifically addresses issues related to acceptance testing of concrete for a clear understanding of associated responsibilities between stakeholders and to establish lines of communication. This checklist is intended to be a guide and may not cover all items that need to be discussed. Notes are provided with more detail and includes references to applicable industry standards.

National Ready Mixed Concrete Association
66 Canal Center Plaza, Ste. 250, Alexandria, VA 22314.
www.nrmca.org



<https://www.nrmca.org/association-resources/research-and-engineering/pre-construction-checklists/>

THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE



Contractor's Conscience: Pet Peeves



- Tolerances
- Slab Moisture & Vapor Retarders
- Slab thickness
- Constructability
- Expectations – cracking
- Birdbaths
- Defects and resolution
- Specifications – good, bad, & ugly...





- Position Statements
– 50 topics since 2002

ASCC POV

PS-01 - Hard Trowel Finish on Air-entrained Concrete

PS-02 - Location of Welded-Wire Reinforcement in Concrete Slabs

PS-03 - Coatings that Affect Bond to Reinforcement

PS-04 - Trowel Marks on Concrete Floors

PS-05 - Specifications for Crack Repair

PS-06 - Division 3 versus Division 9 Floor Flatness Tolerances

PS-07 - Birdbaths on Concrete Slab

PS-08 - Bugholes in Formed Concrete

PS-09 - Slab Thickness Tolerances

PS-10 - Moisture-Sensitive Floor Coverings on Concrete Slabs

PS-11 - Appearance Requirements for Concrete Slabs

PS-12 - Responsibility for Buying Concrete

PS-13 - Use of ACI Committee Reports and Guides in Project Specifications

PS-14 - Anchor Bolt Tolerances

PS-15 - Setting Time Expectations for Hard-Trowel Finishing

PS-16 - Referee Test for Flexural Strength Acceptance

PS-17 - Free Fall of Concrete

PS-18 - Concrete Tolerance Coordination

PS-19 - Balcony Drainage

PS-20 - Testing Fresh Concrete at Point of Delivery

PS-21 - Contractor Value Engineering

PS-22 - Reverse Auction Bidding

PS-23 - Contraction Joints in Elevated Slabs

PS-24 - Tolerances for Suspended Concrete Slabs

PS-25 - Floor Finishing Specifications

PS-26 - Misuses of the Moisture-Vapor Emission Test

PS-27 - Formed Surface Requirements for Waterproofed Walls

PS-28 - Retarded Setting

PS-29 - Crack in Slabs on Ground

PS-30 - Responsibility for Slab Curling

PS-31 - Acceptable Use of Calcium Chloride in Concrete

PS-32 - Concrete Discharge Time Requirements

PS-33 - Cracks In Structural Concrete

PS-34 - Who Pays For Additional Testing

PS-35 - The Effect of Curling on Floor Flatness

PS-36 - The Effect of Deflection on Floor Flatness

PS-37 - Open-Graded Base Courses for Slabs-on-Ground

PS-38 - Topping Slabs over Prestressed Members

PS-39 - Concrete Floor Slabs on Cambered Structural Steel

PS-40 - Protection of Concrete Work

PS-41 - Limit on Requirements for Correcting Nonconforming Work

PS-42 - Proper Use of ACI Reference Specifications

PS-43 - Concrete Industry Tolerances for ADA/ABA Work

PS-44 - Measuring Air Content in Non-Air-Entrained Concrete

PS-45 - Managing Concrete Projects: Concrete/Steel Price and Delivery Volatility Risks

PS-46 - Water-Cementitious Material Ratio for Concrete to Receive a Trowel Finish



AMERICAN SOCIETY OF
CONCRETE CONTRACTORS

TECHNICAL CHECKLIST CONCRETE CORE TESTING

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THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE



Agree to Disagree?

Position Statement #44

Measuring Air Content in Non-Air-Entrained Concrete

On ASCC Position Statement #44, Measuring Air Content in Non-Air-Entrained Concrete

*Colin Lobo, Executive Vice President
Division, National Ready Mixed Concrete
(NRMCA)*

*Eric Misenheimer, Technical Services Manager
Concrete*

ASCC's response

ASCC Finishing Subcommittee: Steve Lloyd, Lloyd

We appreciate the writers' understanding and concern for the variables that affect finishing concrete and how challenging it can be for the concrete contractor to consider SCMs, temperature, humidity, wind, and other factors. It is difficult to assess the relative importance of all these factors because some have not been studied.

Bruce Suprenant, ASCC Liaison.

Concrete International, Sep 2019

THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

 **CONCRETE
CONVENTION**



Another Place to Opine – CI Q&A

- Probably 25% of Q&A
- Relevant
- Succinct
- Well referenced

Concrete Q&A

Is the GC's interpretation correct?

In one word, no.

Concrete
Q&A

Can Testing Laboratories Have True Companions?

Table 1:
Comparisons of test results provided by the owner's and producer's testing agencies

Date	Testing agency	Slump, in.	Air content, %	28-day compressive strength, psi
	Owner	100	4.50	5730

Based on these test results, the differences between the testing agencies are within the precision stated in the applicable ASTM test methods. In most cases, the compressive strength from the concrete supplier's testing agency is marginally higher than those of the owner's testing agency, suggesting that there may be a systemic bias, but there is no basis to indicate that these results are statistically different. We also can't say if the results of one testing agency are better or worse than another.

ARTÍCULO
4
CUATRO

Concreto, Preguntas y Respuestas:
¿Los laboratorios de pruebas pueden tener pruebas complementarias reales?

Are Slabs on Vapor Retarders Isolated?

- ACI 318 exposure classes
 - Sulfate resistance
 - Exposure to moisture
 - Max w/cm – impacts constructability
 - Alkali aggregate reactions

Vapor Barriers Used with Capillary Breaks Reduce the Severity of Sulfate Exposure of Concrete

Industry practice and test data provide supporting evidence

by James Klinger, Colin L. Lobo, and Bruce A. Suprenant



Concrete International, Aug 2021

THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE



Low Strength Result: The Sky is not Falling!

- Do we overdesign too much?
- ACI acceptance criteria – statistical...
- f'_c is not a *minimum*
- Owner benefits from *reduced cost*

Concrete International, Feb 2022

Expect Compressive Strength Test Results Less Than Specified Strength on Every Project

Use engineering judgment, test reserve cylinders, and extract cores only if evaluation is warranted

by James Klínger, Colin L. Lobo, Eamonn F. Connolly, and Bruce A. Suprenant

Table 1:

Expected number of compressive strength test results less than f'_c

Volume of placed concrete, yd ³	Minimum number of tests		Expected number of tests less than f'_c	
	One per 150 yd ³ (ACI 318-19, ACI 301-20)	One per 100 yd ³	One per 150 yd ³ (ACI 318-19, ACI 301-20)	One per 100 yd ³
1000	7	10	1	1
10,000	70	100	7	10
50,000	334	500	34	50
100,000	667	1000	67	100

ARTÍCULO
2
DOS

En cada proyecto debemos esperar que los resultados de los ensayos de resistencia a la compresión sean inferiores a la resistencia especificada

Involucrar el juicio de un ingeniero, ensayar cilindros de reserva y extraer núcleos sólo si se pueden evaluar
por James Klínger, Colin L. Lobo, Eamonn F. Connolly y Bruce A. Suprenant



Revisions to MasterSpec (033000)

- 2016 – Suprenant and Lobo – Avitru (contract to update MasterSpec)
- 2018 ver. – about 50% accepted

NRMCA Suggestions for revisions to AIA MasterSpec 033000 (6/14)

Pg 2, line 7—revise definition to that in ACI 318

7 A. Cementitious Materials: Portland cement alone or in combination with one or more of the
8 following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume;
9 materials subject to compliance with requirements.

cementitious materials—materials that have cementing value if used in concrete either by themselves, such as portland cement, blended hydraulic cements, and expansive cement; or such materials in combination with fly ash, other raw or calcined natural pozzolans, silica fume, and slag cement.

Pg 2, line 10—use notation w/cm for water to cementitious materials ratio

B. W/C Ratio: The ratio by weight of water to cementitious materials. w/cm = water-cementitious material ratio

water-cementitious materials ratio—ratio of mass of water, excluding that absorbed by the aggregate, to the mass of cementitious materials in a mixture, stated as a decimal.

Pg 2, line 14—include a statement to notify EOR or Architect of scheduled meeting. (They can attend if they wish)

14 A. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.

17 1. Before submitting design mixtures, review concrete design mixture and examine
18 procedures for ensuring quality of concrete materials. Require representatives of each
19 entity directly concerned with cast-in-place concrete to attend, including the following:

20 a. Contractor's superintendent.
21 b. Independent testing agency responsible for concrete design mixtures.
22 c. Ready-mix concrete manufacturer.
23 d. Concrete Subcontractor.

Pg 3, Line 30—consider replacing this to include details on design mixtures—this is consistent with 318. Note that amounts of water withheld cannot be documented on a submittal as it is a real-time issue during delivery and can be noted on a delivery ticket. Also it is not possible to submit alternate mixtures for all anticipated conditions listed below.

Revisions to MasterSpec (033000)

- 2022 – Suprenant and Lobo – Deltek (contract to update MasterSpec)
- In progress

- c. Air content.
- d. Seven-day compressive strength.
- e. 28-day compressive strength.
- f. ~~Permeability~~ evaluation of permeability-reducing admixtures.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and **ACI 301 (ACI 301M)**.

1.9 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with **ACI 301 (ACI 301M)** ~~and ACI 306.1~~ and as follows.

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
2. When ~~average high and low air~~ temperature has fallen to, or is expected to fall below 40 deg F (4.4 deg C) for three successive days during the protection period, maintain delivered concrete mixture temperature within the temperature range required by **ACI 301 (ACI 301M)**.
3. Do not use frozen materials or materials containing ice or snow.
4. Do not place concrete in contact with surfaces less than **35 deg F (1.7 deg C)**, other than reinforcing steel.
5. ~~Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.~~

Commented [CL24]: CRD C48 is referenced on pg 13? Specifically related to the qualification of permeability-reducing admixtures (PRAH). This method should not be required for qualification of proposed concrete mixtures. This test method is dated (1992) and a cumbersome method that is not performed by many labs. Indicate here that this would be specific to the use of this type of admixture. If permeability of proposed concrete mixtures is needed, alternative applicable methods would be – ASTM C1202 or C1876. Clear criteria should be stated. Requirement for permeability should override stated max w/cm. No point having a prescriptive and performance requirement for the same intent.

Commented [CL25]: Referring to ACI 301 is adequate. ACI 306.1 is dated and has conflicting requirements to ACI 301.

Commented [bs26R25]: Bruce Suprenant Definitely agree, do not use ACI 306.1. The committee is working on an update but the current version is from 1990.

Commented [bs27]: This definition is no longer in use and has been difficult to enforce due to the three successive days. In other words, you don't know you have cold weather until after the third day. The new definition used in both ACI 306R-10 and ACI 306R-16 is easier to understand and enforce.

Commented [CL28]: This is not necessary in this section. The prohibition to use calcium chloride should be stated elsewhere. Use of other accelerators should not be restricted.

ASCC-NRMCA Partnership

- NRMCA provided a seat on ASCC Board
- NRMCA/ASCC Joint Paving Committee
- NRMCA provides design assistance (DAP) and Life-Cycle Cost Analysis (LCCA) to support parking lot promotion
 - Success with several million square feet of conventional and overlay parking lot paving
- ASCC Awareness of PaveAhead and Build With Strength campaigns
- ASCC Contractors partner with NRMCA on webinar and sessions
- Education on construction with Insulated Concrete Forms (ICF)
- Parking Lot Boot Camp

Concrete Parking Lots Boot Camp

- 10-hr training – individual producer and contractor
- ACI PRC 330 – Guide to Parking Lot Design & Construction
- Guide to Overlays of Asphalt
- Design Assistance/Joint Plan
- PavementDesigner.org
- Life-Cycle Cost Analysis
- Salespersons – prospect for new business
- Collaboration between producer and contractor



BS-isms

- Did you ever work on something and feel like you never really made a difference?
- As a consultant, I don't charge much to stand around and stroke my beard while attempting to look intelligent. I just guarantee the intelligent part.
- You ever see anything messed up like this? Engineer specifically states in the General Notes that no water can be added at job site if the concrete in the truck contains a HRWR? Not sure I'll be able to convince the engineer. Damn.
- We anticipate amusement in bug-eyed looks on building officials attempting to grasp floor tolerances. We at ASCC, however, do not take pleasure in this type of amusement.
- We want to add your name at the bottom for the usual no-paying, no-fame acknowledgement that ACI passes out.
- Get this right like you always do. Its too late in your career to screw up. You have too many mouths to feed!
- Looks like ASCC will start a sustainability committee—wonderful.
- If you search CI for Malisch, Lobo, and Suprenant, Ward has 10, Lobo has 27, and Suprenant has 49. Ward won't catch you, but I have you beat. But I am out of here soon, so maybe you can catch up...



Bruce – Thanks! And Keep on the Trail!



**HAPPY
TRAILS**



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