

AGENDA

ACI 231: Properties of Concrete at Early Ages

Monday, March 24, 2014 – 2:00 to 4:00 pm
CASCADE 1, Grand Sierra Resort, Reno, Nevada

1. **Welcome and Introductions**
2. **TAC Update**
3. **Review and Approval of Minutes from the October 2013 Meeting**
4. **Committee Membership Update**
5. **ACI 231 Technical Sessions**

Reno, NV: *(Spring 2014 – Concrete Endures)*

- Title: **Hydration of Low Portland Cement Binders: Part 1 and 2**
 - Organizers: Jeff Bullard, Gaurav Sant, and Karthik Obla
 - Co-sponsors: ACI 231, 232, 233, and 236
 - Monday, March 24, 2014 8:30 - 9:00 am and 11:00 am -1:00 pm
- Title: **Delayed Ettringite: Causes, Evaluation of Existing Structures, and Prevention**
 - Organizers: Oscar Antommattei and Kyle Riding
 - Co-sponsors: ACI 231 and 201
 - Monday, March 24, 2014 4:00 - 6:00 pm, CARSON 3

Washington, DC: *(Fall 2014 – Spanning the Globe)*

- Dates: Preliminary approval = October 25, 2013
Final approval = March 28, 2014
- Title: **Improving Early-Age Properties of Concrete with SCMs**
 - Organizers: Wayne Wilson, Jussara Tanesi, and Dale Bentz
 - Potential co-sponsors: ACI 231, 232, and 212

Kansas City, MO: *(Spring 2015 – Fountains of Concrete Knowledge)*

- Dates: Preliminary approval = March 28, 2014
Final approval = October 31, 2014

Denver, CO: *(Fall 2015 – Constructability)*

- Dates: Preliminary approval = October 2014
Final approval = March 2015
- Title: **Measurement Methods for Early-Age Deformations**
 - Organizers: Jason Ideker and Gaurav Sant
 - Potential co-sponsors: ACI 231 and 236
 - An SP could be pursued.

Other Suggested Topics:

- Title: **Test Methods for Measuring Early-Age Properties: Lab and In-Situ Monitoring**
 - Organizers: by Wayne Wilson and Daniel Cusson
- Title: **Influence of Chemical Admixtures on Early-Age Concrete Properties**

6. Development of ACI Committee 231 Report

6.1 Review of Ballot Results

- Chapter 6: In-Situ Monitoring
 - Ballot closed on 3/21/2014
 - Thank you to Zach Grasley, Matt D'Ambrosia, and Kyle Riding for their hard work to develop this chapter

6.2 Update on Chapters

- Title: Prediction and Control of Thermal Effects at Early Ages
- Report Outline: Refer to Attachment A

7. New Business

- Congratulations to Jason Weiss who will become the new chair of ACI Committee 231 effective March 28, 2014

8. Adjourn

Attachment A: ACI Committee 231 Report

Title: Prediction and Control of Thermal Effects at Early Ages

Objectives: Provides guidance on the prediction and control of early-age thermal effects in concrete.

Completion: Finalize during ACI meeting in Denver, October 2015. Chapters will be balloted individually.

OUTLINE

Last Updated on February 2014

Chapter 1: Introduction

Lead authors: Anton Schindler and Will Hansen

Complete First Draft: August 2015

Ballot: Before Denver, October 2015

Chapter 2: Hydration

Lead authors: Wayne Wilson, Anton Schindler, and Jason Ideker

Editorial committee: Dale Bentz and Gaurav Sant

Complete First Draft: August 2014

Ballot: Before Washington, D.C., Oct. 2014

- 2.1 Hydration Kinetics
 - 2.1.1 Effect of Temperature
 - 2.1.2 Temperature Sensitivity (Activation Energy)
- 2.2 Factors Impacting Hydration
 - 2.2.1 Cement Chemistry (Including alkalinity)
 - 2.2.2 Cement Fineness
 - 2.2.3 Supplementary Cementing Materials (SCMs)
 - 2.2.4 Chemical Admixtures
 - 2.2.5 Potential Incompatibility Issues
- 2.3 Delayed Ettringite Formation (DEF)
- 2.4 Measurement Methods
- 2.5 Maturity Methods

Chapter 3: Thermophysical Properties

Lead authors: Miguel Azenha, Geert DeSchutter, and Anton Schindler

Completed in October 2013

- 3.1 Introduction
- 3.2 Density
- 3.3 Thermal Conductivity
- 3.4 Specific Heat
- 3.5 Coefficient of Thermal Expansion

Chapter 4: Mechanical Properties

Lead author: Geert De Schutter

Complete First Draft: August 2014

Ballot: Before Washington, D.C., Oct. 2014

- 4.1 Strength Development
- 4.2 Stiffness Development (Ben Byard offered assistance to add data for this section)
- 4.3 Creep and Relaxation (Ben Byard and Matt D'Ambrosia offered to help add data to this section)
- 4.4 Limiting Strain or Stress Capacity

Chapter 5: Heat Transfer and Stress Analysis

Lead author: Kyle Riding

Complete First Draft: August 2014

Ballot: Before Washington, D.C., Oct. 2014

- 5.1 Heat Transfer Fundamentals (Lead author: Miguel Azenha)
 - ACI 207.2R may be a good reference to cite
 - Manual methods (Schmidt method) should be mentioned
- 5.2 Software Programs
 - 5.2.1 Introduction (what makes the software special is that they have the constitutive laws built in.)
 - 5.2.2 HIPERPAV (Lead author: Kyle Riding)
 - 5.2.3 ConcreteWorks (Lead author: Kyle Riding)
 - 5.2.4 FEMMASSE (Lead author: Kambiz Raoufi and Will Hansen)
 - 5.2.5 4C-Temp and Stress (Anton Schindler)

Chapter 6: In-Situ Monitoring

Lead authors: Zach Grasley and Matt D'Ambrosia

Editorial committee: Anton Schindler and Kyle Riding

Ballot started in February 2014

- 6.1 Introduction
- 6.2 Temperature and Relative Humidity
 - 6.2.1 Instrumentation Equipment
 - 6.2.1.1 Strain Sensors
 - 6.2.1.2 Thermocouples
 - 6.2.1.3 Digital Temperature Sensors and Wireless Data Collection
 - 6.2.1.4 Accuracy and Sources of Potential Error
 - 6.2.1.5 Sensor Validation
 - 6.2.2 Relative Humidity
- 6.3 Strength
 - 6.3.1 Maturity Meters
 - 6.3.2 In-Place Strength Tests

Chapter 7: Control of Thermal Effects

Lead author: Kambiz Raoufi

Complete First Draft: August 2015

Ballot: Before Denver, October 2015

- 7.1 Introduction
 - Scope is limited to thermal effects which is only one component of strains that can lead to cracking –can reference earlier document for fibers and SRAs
- 7.2 Placement Scheduling (Authors: Jan Olek and Anton Schindler)
- 7.3 Fresh Concrete Temperature Control (Author: Maria Juenger)
- 7.4 Control of Thermal Gradients (Author: Kamran Nematı and Miguel Azenha)
 - Add Three Gorges Dam Data
 - CI articles by Ric Maggenti about the use of cooling pipes by Caltrans may be useful.
- 7.5 Mixture Modifications (Author: Maria Juenger)
 - 7.5.1 Use of SCMs (Author: Maria Juenger)
 - 7.5.2 Chemical Admixtures
 - Contact Emmanuel Attiogbe to help develop this section
 - 7.5.3 Use of Aggregates (Authors: Ben Byard and Jason Weiss)
 - 7.5.3.1 Normalweight Aggregates
 - 7.5.3.2 Lightweight Aggregates
 - 7.5.3.3 Fillers (Amal Jayapalan) [Perhaps part of 7.5.1 ?]
 - 7.5.4 Fibers (Jason Ideker)