

AGENDA

ACI 231: Properties of Concrete at Early Ages

Monday, October 22, 2012 – 2:00 to 3:30 pm
Conference Room C, Sheraton Centre, Toronto, ON, Canada

- 1. Welcome and Introductions**
- 2. Update on Membership Status**
- 3. Review and Approval of Minutes from the Meeting in Dallas, March 2012**
- 4. Status of ACI 231 Technical Sessions**

Toronto, Canada: *(Fall 2012 – Forming Our Future)*

- Title: **The Economics, Performance, and Sustainability of Internally Cured Concrete**
 - Session Organizers: Anton Schindler, George Grygar, and Jason Weiss.
 - Co-sponsored by ACI Committees 231, 213, and 130.
 - 3 x 2-hr technical sessions will be held in Toronto on Tuesday
- ACI SP with 14 papers is available.

Minneapolis, MN: *(Spring 2013 – Responsibility in Concrete Construction)*

- Dates: Preliminary approval = March 23, 2012 and final approval = October 26, 2012.
- Title: **Early-Age Properties of Repair Binders (Lab, Field and Test Methods)**
 - Session Organizer: Kyle Riding

Phoenix, AZ: *(Fall 2013 – Innovation in Conservation)*

- Dates: Preliminary approval = October 26, 2012 and final approval = April 19, 2013.
- Title: **Innovation in Cooling Mass Concrete.**
 - Co-sponsored by ACI Committees 231 and 207.
 - Session Organizers: Anton Schindler, Miguel Azenha, and John Gajda (207)
 - Speakers: 2 x U.S.A., Portugal, Brazil, and Japan

Reno, NV: *(Spring 2014)*

- Dates: Preliminary approval = April 19, 2013 and final approval = October 25, 2013.
- No sessions scheduled for this convention.

Washington, DC: *(Fall 2014)*

- Dates: Preliminary approval = October 25, 2013
- Title: **Improving Early-Age Properties of Concrete with SCMs**
 - Potential Organizers: Dale Bentz, Jussara Tanesi, and Kyle Riding
 - Potential co-sponsors: ACI 232 (Fly Ash and Natural Pozzolans in Concrete) and 212 (Chemical Admixtures)
- Title: **Interaction of Limestone Filler with SCMs**
 - Potential co-sponsor: ACI 236 (Material Science of Concrete)
 - Tim Cost was suggested as a potential speaker for this session

Other Suggested Topics:

- Title: **Test Methods for Measuring Early-Age Properties: Lab And In-Situ Monitoring**
 - Suggested by Wayne Wilson
- Title: **Early-Age Volume Change Effects**
 - Potential Organizers: Jason Ideker and Gaurav Sant
 - Target 2014, i.e. either Reno or Washington

Future Conventions:

Kansas City, MO: (Spring 2015)
Preliminary session approval
requests due: March 28, 2014

Denver, CO: (Fall 2015)
Preliminary session approval
requests due: TBA

- 5. Development of ACI Committee 231 Report**
 - Title: Prediction and Control of Thermal Effects at Early Ages
 - Report Outline: Refer to Attachment A
- 6. New Business**
- 7. 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 Minneapolis, April 2013 (i.e. 18 months from meeting in Cincinnati). Chapters will be balloted individually.

REPORT OUTLINE

Last Updated on March 19, 2012

Chapter 1: Introduction

Lead authors: Anton Schindler and Will Hansen
Complete First Draft: July 2012 Ballot: Before meeting in Toronto, Oct. 2012

Chapter 2: Hydration

Lead author: Wayne Wilson
Editorial committee: Dale Bentz, Anton Schindler, and Gaurav Sant
Complete First Draft: May 2012 Ballot: Before meeting in Toronto, Oct. 2012

- 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 author: Miguel Azenha
Complete First Draft: August 2012 Ballot: Before meeting in Toronto, Oct. 2012

- 3.1 Introduction
 - Cover why thermal properties are important
- 3.2 Thermal Conductivity
- 3.3 Specific Heat
- 3.4 Coefficient of Thermal Expansion (Ben Byard offered to supply data for this section)

Chapter 4: Mechanical Properties

Lead author: Geert De Schutter
Complete First Draft: August 2012 Ballot: Before meeting in Toronto, Oct. 2012

- 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: Feb. 2013

Ballot: Before Minneapolis, March 2013

- 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: Will Hansen)
 - 5.2.5 4C-Temp and Stress (Anton Schindler will correspond with the developers)

Chapter 6: In-Situ Monitoring

Lead authors: Zach Grasley and Matt D'Ambrosia

Editorial committee: Anton Schindler and Kyle Riding

Complete First Draft: June 2012

Ballot: Before meeting in Toronto, Oct. 2012

- 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: TBA

Complete First Draft: Feb. 2013

Ballot: Before Minneapolis, March 2013

- 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 Nemati 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