

# **AGENDA**

## **ACI 231: Properties of Concrete at Early Ages**

Monday, October 17, 2011 – 2:00 to 3:30 pm  
Room C-263, Duke Energy Convention Center, Cincinnati, Ohio

- 1. Welcome and Introductions**
  - Kyle Riding has agreed to serve as the secretary of ACI 231
- 2. Update on Membership Status**
- 3. Review and Approval of Minutes from the Meeting in Tampa, April 2011**
- 4. Status of ACI 231 Technical Sessions**

### **Dallas, TX:** *(Spring 2012 – The Art of Concrete)*

- Title: Early-Age Hydration Kinetics and Temperature Effects on Concrete Durability
  - Session Organizers: Joseph Biernacki, Zachary Grasley and Gaurav Sant

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

- TAC Comment: Additional technical session slots are still available. Preliminary Session Requests are due to October 21, 2011.
- Title: The Economics, Performance, and Sustainability of Internally Cured Concrete
  - Session Organizers: Anton Schindler, George Grygar, and Jason Weiss.
  - Co-sponsored by ACI Committees 237, 213, and 130.
  - Call for Papers appeared in Concrete International
  - 16 Abstracts were received.
  - The following schedule will be followed:
    - December 15, 2011: Completed paper due for peer review
    - May 10, 2012: Final papers due

### **Future Sessions:**

- Early-Age Performance of SCC
  - Session Organizer: Matt D'Ambrosia
- Early-Age Properties of Repair Binders
  - Session Organizer: Kyle Riding

### **Future Conventions:**

**Minneapolis, MN:** (Spring 2013)  
Theme: TBD

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

**Reno, NV:** (Spring 2014)  
Theme: TBD

**Washington, DC:** (Fall 2014)  
Theme: TBD

- 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:** This document provides guidance on the prediction and control of early-age thermal effects in concrete.

## OUTLINE

Last Updated on October 4, 2011

### **Chapter 1: Introduction**

Lead authors: Anton Schindler and Will Hanson

### **Chapter 2: Hydration**

Lead author: Wayne Wilson

Editorial committee: Dale Bentz, Anton Schindler, and Gaurav Sant

Target Dates: First draft by July 4, 2011. Ballot before meeting in Cincinnati.

- 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
- 2.3 Measurement Methods
- 2.4 Maturity Methods

### **Chapter 3: Thermophysical Properties**

Lead author: Miguel Azenha

- 3.1 Introduction
  - Cover why thermal properties are important
- 3.2 Thermal conductivity
- 3.3 Specific heat

### **Chapter 4: Mechanical Properties**

Lead author: Geert De Schutter

- 4.1 Strength development
- 4.2 Stiffness development
- 4.3 Creep and relaxation
- 4.4 Limiting strain or stress capacity

### **Chapter 5: Heat Transfer and Stress Analysis**

- 5.1 Heat Transfer Fundamentals (Lead author: Elin Jensen and 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 HIPERPAV (Lead author: Kyle Riding)
  - 5.2.2 ConcreteWorks will be covered (Lead author: Kyle Riding)
  - 5.2.3 Femmasse will be covered (Lead author: Will Hansen)

## **Chapter 6: In-Situ Monitoring**

Lead authors: Zach Grasley and Matt D'Ambrosia  
Editorial committee: Anton Schindler and Kyle Riding  
Target Dates: First draft before meeting in Cincinnati.

- 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: Temperature Control Techniques**

- 7.1 Placement Scheduling (Authors: Jan Olek and Anton Schindler)
  - 7.2 Mixture Modifications (Author: Maria Juenger)
  - 7.3 Control of Thermal Gradients (Author: Kamran Nemati and Miguel Azenha)
    - Add data from Three Gorges Dam
    - CI articles by Ric Maggenti about the use of cooling pipes by Caltrans may be useful.
  - 7.4 Use of SCMs (Author: Maria Juenger)
  - 7.5 Use of Aggregates (Authors: Ben Byard and Jason Weiss)
    - 7.5.1 Normalweight Aggregates
    - 7.5.2 Lightweight Aggregates
- Marwan Daye: In some cases, large concrete mock-up elements are cast to evaluate the temperature control measures.

## **References**