Shrinkage-Compensating Concrete—Past, Present, and Future, Part 2
ACI Fall 2012 Convention
October 21 – 24, Toronto, ON

Jason Barnes, President, Green Umbrella, Sheridan, AR

REVOLUTION
- PRESENTERS
  - Larry Valentine
  - ShrinkageComp Plus
  - Jason Barnes
  - Green Umbrella

REVOLUTIONS
- REVOLUTION #1
  TYPE G SHRINKAGE-COMPENSATING CONCRETE
- REVOLUTION #2
  COMPONENTS

TYPE G
- A NEW SHRINKAGE-COMPENSATING CONCRETE DESIGNATION
- USER FRIENDLY
- ECONOMICAL
COMPONENTS

- NOT A CEMENT
- NOT AN ADDITIVE
- USER FRIENDLY
- ECONOMICAL

COMPONENTS

- Mineral based
- Cementitious
- Dry
- User Friendly
- Economical

TYPE G PLATELET

LENGTH CHANGE COMPARISON

CONCRETE GROWTH

- STARTS WITH MIXING
- PLASTIC STAGE - PLACEMENT
- INITIAL SET
  - CONCRETE STARTS TO SET/HARDEN
  - BONDING BEGINS
  - RESTRAINT STARTS TO FORM

CONCRETE GROWTH

- COMpressive STRESS INCREASES
- MAXIMUM EXPANSION REACHED
- MAXIMUM RESTRAINT REACHED
- RELAXATION STARTS
- RETURNS TO AS CAST VOLUME
**PRIMARY ADVANTAGES**

- Shrinkage cracks eliminated
- Contraction joints eliminated
- Edge curling eliminated

**SECONDARY ADVANTAGES**

- Increased durability
- Increased sustainability
- Greener construction
- Economical construction

**EXPANSION CURVE**

**DOSAGE RATES**

Recommend trial dosage rates:

- 10% Structural Reinforcing
- 8% Temperature Reinforcing
- 4% SRA results
- 0% Shrinkage Cracking

**W/CM RATIO**

**TYPE G**

- As specified standard
- Include Type G in total cementitious

**TYPE K**

- Increase – Table 6.1 ACI 223R-10
  - 0.60 to 0.63 for 4000psi
  - 7 day water cure
  - Ettringite formulation

**TYPE COMPARISONS**

Design

- Type G & Type K Identical

Construction

- Type G – Standard
- Type K – Special techniques & procedures

Structure

- Type G & Type K Identical
TYPE K CONSTRUCTION

- Requires water for ettringite formation
  - Higher w/cm ratio
  - Keep moist - fog misters
  - 7 day water cure
- Chemically reactive
  - Mix design varies
  - Mix design constant

TYPE K CONSTRUCTION - 2

ACI 223R-10, Section 7.1.4

- 90°F Concrete temperature limitation
- Mix time limitations

TYPE G CONSTRUCTION

COST ADVANTAGES

- Components vs Cements
  - Lower production costs
  - Lower transportation costs
  - No dedicated silo

REVOLUTION CONCLUSIONS

- Component economy
  - As compared to cements
- Type G vs. Type K
  - Lower dosage
  - Cheaper shipping
  - User friendly
  - Economical construction cost

REVOLUTION CONCLUSIONS

- Lowest life cycle costs
  - Less concrete maintenance
  - Less joint maintenance
  - Greater durability
- Greener Construction
  - Sustainability