

Guide Specification Internal Curing (Scheduled for Publishing - January 2018)

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Guide Specification for Internally Curing Concrete

DRAFT
September 2017



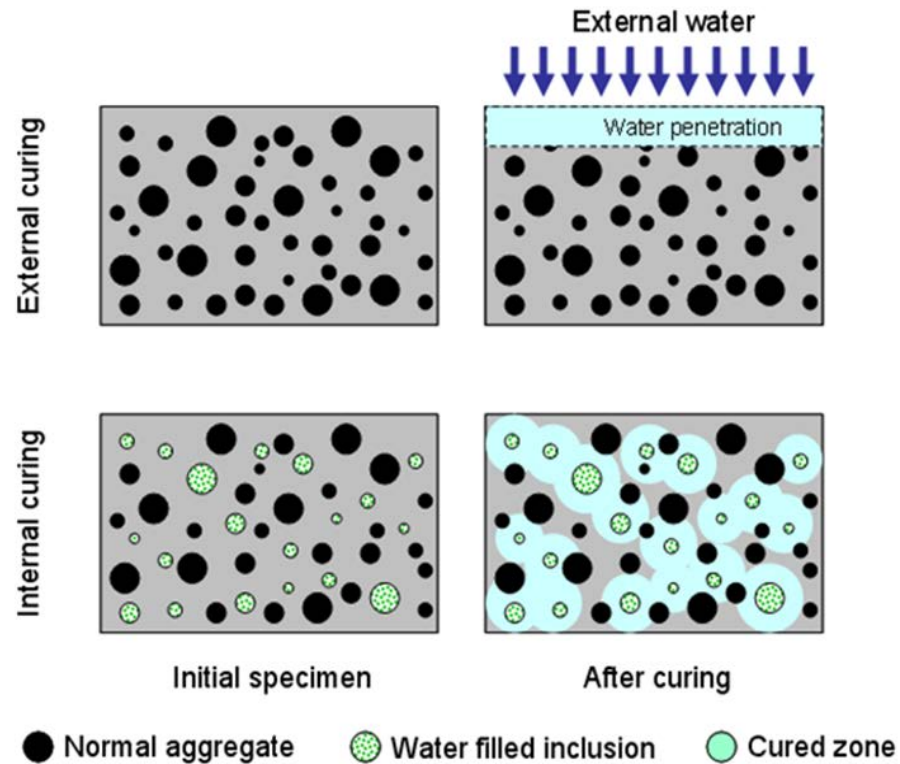
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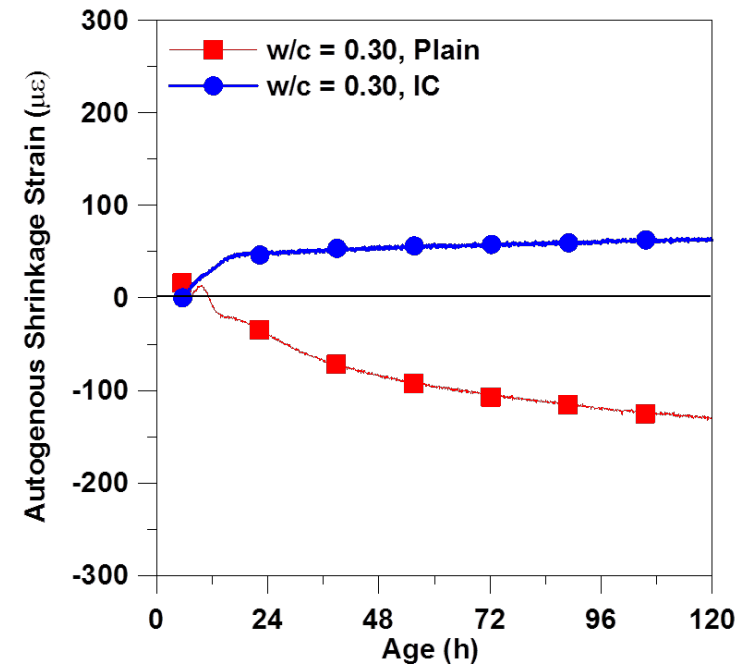
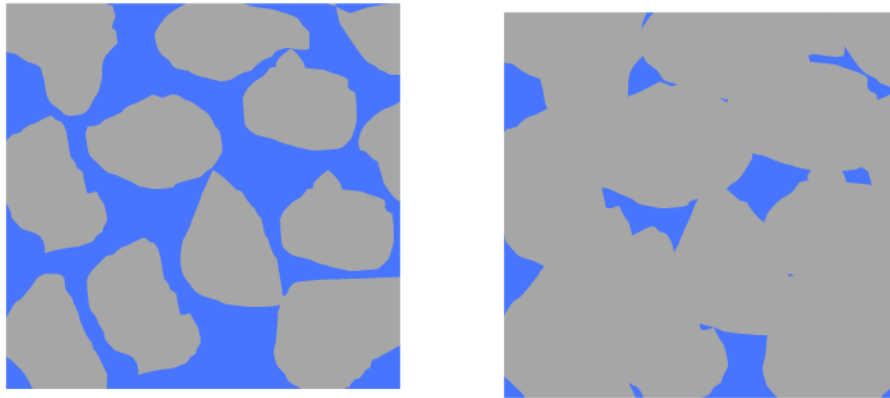
What Is Internal Curing

- Internal Curing (IC) has been defined in 2013 by the American Concrete Institute as: “a process by which the hydration of cement continues because of the availability of internal water that is not part of the mixing water.”



What are the Benefits of IC

- Reduced Autogenous Shrinkage
- Increased Cement Hydration



Barrett (2013)

- Improved Curing when Short Cure Times are Permitted

Applications

- Bridge Decks
 - Shown to reduce cracking
 - Long service life
- High Early Strength Patches and Overlays
 - Reduced built-in-stress caused shrinkage restraint
 - Increased water curing after opening
- Note: Research underway to determine the influence of IC on curling and built in stress
- Note: Reduction in curing time is underway



Internal Curing Agents - LWA

- IC Concrete is most commonly made by replacing a portion of the fine aggregate in concrete with prewetted fine light weight aggregate LWA.
- Water remains in the fine LWA during mixing and until the time of set.
- At the time of set capillary stresses developed in the concrete draws the water out of the fine LWA and curing the concrete section



Internal Curing Agents - SAP

- Superabsorbent Polymers (SAP) are an alternative to LWA and are used to absorb additional mix water before setting (additional mix water is added to the mixture that results in a portion of the pore solution being absorbed by the SAP that is not considered in determination of the w/cm).
- The Internal Curing Specification is developed for LWA with potential SAP applications on the horizon and a test for absorption in the appendix.



Guide Specification Internal Curing

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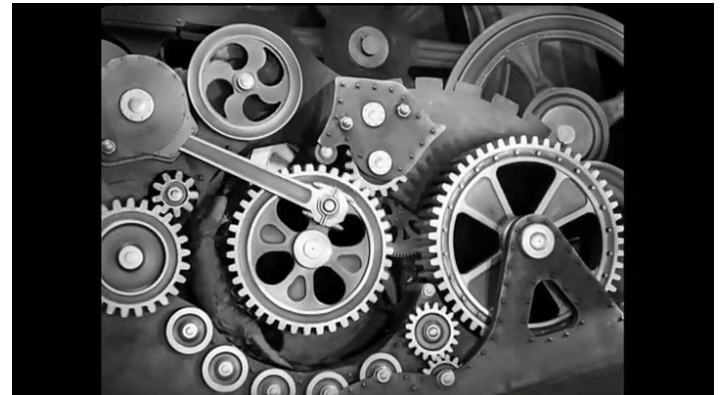
- I. Introduction- *what is internal curing*
- II. Internal Curing Map Brief
 - A. Internal Curing Concept
 - B. Mix Proportioning
 - C. Operations
 - D. Potential Applications



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III. Guide Specification

- A. How to Use the Guide
- B. Additional Internal Curing Resources
- C. Websites Related to Internal Curing
- D. Standard Practices
 - 1. Scope
 - 2. References
 - 3. Terminology
 - 4. Materials



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5. Sampling
6. Proportioning
7. Concrete Acceptance Requirements
8. Quality Control
9. Test Reports
10. References



IV. Appendix A- The Absorption of Superabsorbent Polymers for use in Portland Cement Base Concrete Systems

What is Currently Missing

- Currently, there are several groups ‘trying internal curing’ but we do not have a ‘best practices’ or ‘case studies’ document
- The US is rapidly implementing this (more rapidly than other countries)
- A listing of case studies of where this was used, what was obtained and the cost-benefits would be useful to other agencies

 This would also help to track performance over time and to keep track of projects for monitoring

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Future-

- Move it into AASHTO Specification
- Develop Detailed Case Studies
 - Bridge Decks
 - Concrete Overlays
 - Concrete Pavement Patching
- Development Detailed Training Video

