The ACI 562 Code

How does it affect your concrete repair project?

Code Requirements for Durability – Chapter 8

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Topics for Discussion

- Compatibility of Material
- Durability within the Service Environment
- Cover
- Cracks
- Corrosion of Reinforcement and Metals
- Surface Treatments and Coatings
- Summary Wrap-up

Compatibility of Materials

- Consider the following for compatibility with the structure:
  - Required strength
  - Parent concrete
  - Aesthetics
  - Seismic performance
  - Service Life

Durability within the Service Environment

- Consider the following for service:
  - Environment
    - Loads – Impact - Vibration - Fatigue
  - Chemical
    - ASR – Sulfate – Acid - Leaching
  - Physical
    - Freeze Thaw – Scaling – Thermal - UV Exposure

Maintenance Requirements

- What is the anticipated maintenance?
  - Parent concrete contamination?
  - Freeze thaw protection needed?
  - Finish, concrete quality, ponding, scaling potential?
  - Chemical exposure?
  - Thermal changes?

Durability within the Service Environment

- ICRI Guideline No. 320.3R-2012 for Inorganic Repair Material Data Sheet Protocol Information

ICRI Guideline No. 320.3R-2012

- 5.1 Curing Regimen
- 5.2 Unit Weight
- 5.3 Air Content
- 5.4 Yield
- 5.5 Density, Absorption, and Voids
- 5.6 Setting Time
- 5.7 Compressive Strength
- 5.8 Flexural Strength
- 5.9 Splitting Tensile Strength
- 5.10 Direct Tensile Strength
- 5.11 Modulus of Elasticity
- 5.12 Bond Strength
- 5.13 Length Change
- 5.14 Coefficient of Thermal Expansion
- 5.15 Resistance to Freezing-and-Thawing Cycles
- 5.16 Scaling Resistance
- 5.17 Compressive Creep
- 5.18 Rapid Chloride Ion Permeability
- 5.19 Chloride Ponding
- 5.20 Sulfate Resistance
- 5.21 Chemical Resistance
- 5.22 Cracking Resistance

Cover

- Identify concrete cover requirements in accordance with the Design Basis Code
- Identify potential for corrosion
  - Exposure to cracking
  - Is the reinforcement protected?
    - Corrosion inhibiting coatings on steel?
    - Corrosion inhibiting admixtures?
- Corrosion Protection(s) as follows:
  - Design service life for the structure, if necessary -
    - Using added cover
    - Using protective applications

Cracks

- Consideration for:
  - Durability
  - Service life
  - Overall performance and potential for volume change cracking

Cracks

- Types of materials
  - Sealants, elastomeric properties, limitations
    - Silicone, Polyurethane, Epoxy
  - Modifiers for cementitious products

- Selection of the wrong material will doom a project

Cracks

- References
  - ACI 224.1R for crack investigation and repair
  - ACI 503.7 for injection of cracks

Corrosion of Reinforcement & Metals

- Durability Design
  - Potential for corrosion of reinforcement and embedment
  - Corrosive properties of the repair material

Corrosion of Reinforcement & Metals

- Existing Reinforcement
  - Evaluate for long-term durability
  - Strength of member
  - Encapsulation of reinforcement

- All corrosion byproducts must be removed.

Corrosion of Reinforcement & Metals

- Existing Concrete
  - Moisture and Chemical impact must be mitigated, steel must be protected
  - Provide for proper cover and/or protection
  - Evaluate the potential for ring anode effect
    - Incorporate corrosion protection strategies in the form of inhibitors, coatings, cathodic/anodic protections
  - Reference ACI and ICRI documents and guides.

Corrosion of Reinforcement & Metals

- Additional issues to be aware of:
  - Coatings, sealers, electrochemical
  - Galvanic protection and use of dissimilar metals
  - Bonded and unbonded prestressing systems
  - Impressed current electrochemical protection
- References to NACE guidelines

Surface Treatments & Coatings

- **Goals**: Mitigate Moisture, Chemical, Physical, and Anticipated Maintenance
- Protecting the repair(s) and the structure
- Identify service life for replacement:
  - Surface treatments
  - Coatings
  - Sealers
  - Membranes

Surface Treatments & Coatings

- Encapsulating effects from moisture and internal contaminants on concrete and coatings
  - Potential accelerated deterioration
- Existing cracks and the potential movement
- Whole capability of the application must be evaluated.

ICRI Guideline 310.2R-2013, "Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repairs,"

Factors Affecting Durability

- **Evaluation and Analysis** – Ch. 6
- **Repair Design** – Ch. 7
- **Durability Characteristics –** Ch. 8
  - Service Life Projections
- **QC & QA** – Ch. 10
  - Preparation/Installation
  - Verification
- **Maintenance Recommendations**

The ACI 562 Code Summary

- Chapter 1 – General
- Chapter 2 – Notation and Definitions
- Chapter 3 – Referenced Standards
- Chapter 4 – Basis for Compliance
- Chapter 5 – Loads, Load Combinations & Strength Reductions
- Chapter 6 – Evaluation and Analysis
- Chapter 7 – Design of Structural Repairs
- Chapter 8 – Durability

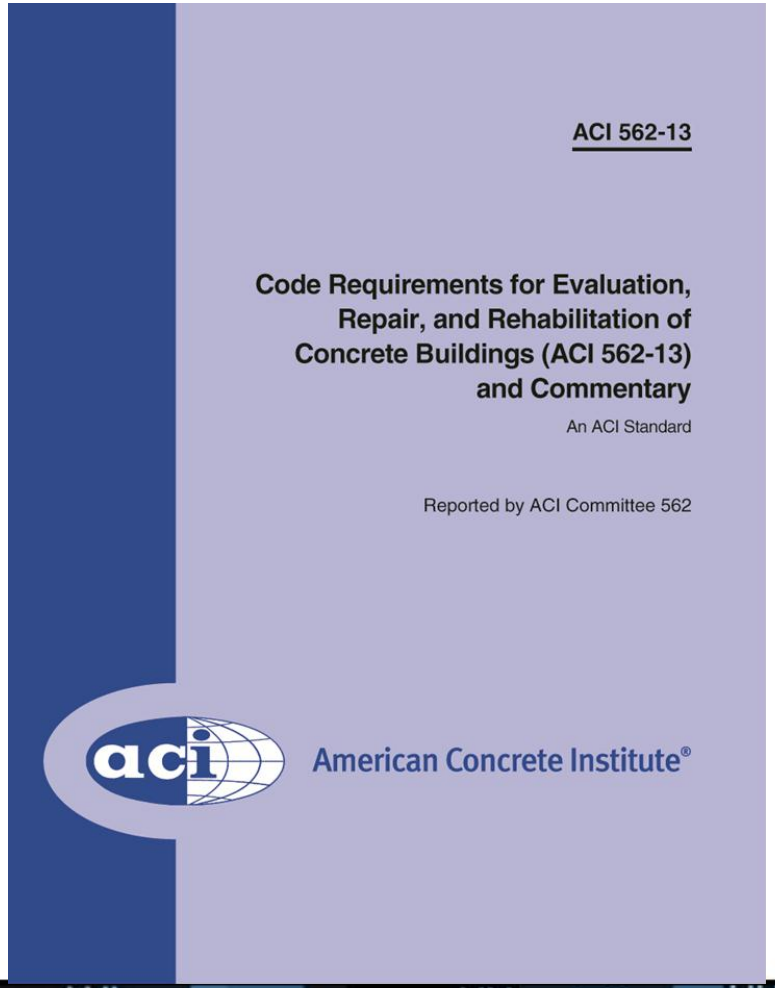
The ACI 562 Code Summary

- Chapter 9 – Construction
- Chapter 10 – Quality Assurance
- Chapter 11 – Commentary References

Additional Information

- Information for the guide can be obtained at the following American Concrete Institute's and International Concrete Repair Institutes websites:
  - www.concrete.org
  - www.icri.org

Thank You



Questions

Save for Forum Discussion