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Specifications for Repair of Concrete in Buildings (ACI 563-18)

Reported by ACI Committee 563

ACI 563-18

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First Printing
August 2019
ISBN: 978-1-64195-073-2

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(SI units)

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Tony Murray was the first committee chair of ACI Committee 563 and a committee member of ACI 563 at the time of his death in 2016. The committee expresses its appreciation for his friendship and leadership.

Special acknowledgement to Matthew R. Hansen* for his contribution to this Specification.

This is a Reference Specification that the Architect/Engineer can apply to any construction repair and rehabilitation project involving structural concrete by citing it in the Project Specifications. Mandatory requirements and Optional requirements checklists are provided to assist the Architect/Engineer in supplementing the provisions of this Specification, as required or needed, by designating or specifying individual project requirements. The first section covers general construction requirements for all repair Work. The second section covers shoring and bracing of the structure or member to be repaired, and addresses sequencing of repair Work as the structure is unloaded and reloaded. The third section covers concrete removal and preparation of the concrete substrate for repair, and defines common equipment and methods. The next five sections cover materials and proportioning of concrete; proprietary cementitious and polymer repair materials; reinforcement; production, placing, finishing, and curing of repair materials; formwork performance criteria and construction; treatment of joints; embedded items; repair of surface defects; mockups; and finishing of formed and unformed surfaces. Provisions governing testing, evaluation, and acceptance of repair materials as well as acceptance of the repair Work are included. Sections 9 and 10 incorporate by reference two other specifications—ACI 503.7 and ACI 506.2—into this ACI Standard to cover crack repair by epoxy injection and shotcrete, respectively.

Keywords: bracing, cold weather; compressive strength; consolidation; curing; durability; epoxy injection; finish; formwork; grouting; hot weather; inspection; joints; mockups; placing; precast; repair; rehabilitation; reshoring; shoring; shotcrete; slab; steel reinforcement; surface preparation; testing; tolerance; welded wire.

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ACI 563-18 was adopted August 15, 2018, and published September 2018.

SECTION 1—GENERAL REQUIREMENTS

1.1—Scope

1.1.1 This Specification covers repair of concrete in existing structures.

1.1.2 This Specification is incorporated by Contract Documents and provides requirements for Contractor.

1.1.3 This Specification governs for construction within its scope, except other Contract Documents govern if there is a conflict.

1.1.4 This Specification governs if there is a conflict with referenced material and testing standards.

1.1.5 Contractor is permitted to submit written alternatives to any provision in this Specification for consideration.

1.1.6 Do not use this Specification in conjunction with ACI 301, ACI 350.5, or ACI 530.11 unless Contract Documents state that this Specification governs for Work covered by 1.1.1.

1.1.7 Ignore provisions of this Specification that are not applicable to Work.

1.1.8 Values in this Specification are stated in inch-pound units. A companion specification in SI units is available.

1.1.9 The Notes to Specifiers are not part of this Specification.

1.2—Interpretation

1.2.1 Unless otherwise explicitly stated, this Specification shall be interpreted using the following principles:

1.2.1.1 Interpret this Specification consistent with the plain meaning of the words and terms used.

1.2.1.2 Definitions provided in this Specification govern over the definitions of the same or similar words or terms found elsewhere.

1.2.1.3 Whenever possible, interpret this Specification so that its provisions are in harmony and do not conflict.

1.2.1.4 Headings are part of this Specification and are intended to identify the scope of the provisions or sections that follow. If there is a difference in meaning or implication between the text of a provision and a heading, the meaning of the text governs.

1.2.1.5 Footnotes are part of this Specification. The meaning of the provision text governs in the event of a difference in meaning or implication between the provision text and a footnote to that provision.

1.2.1.6 Where a provision of this Specification involves two or more items, conditions, requirements, or events connected by the conjunctions “and” or “or,” interpret the conjunction as follows: “and” indicates that all the connected items, conditions, requirements, or events apply; “or” indicates that the connected items, conditions, requirements, or events apply singularly.

1.2.1.7 The use of the verbs “may” or “will” indicates that the Specification provision is for information to the Contractor.

1.2.1.8 The phrase “as indicated in Contract Documents” means the specifier included the provision requirements in Contract Documents.

1.2.1.9 The phrase “unless otherwise specified” means the specifier may have included an alternative to the default requirement in Contract Documents.

1.2.1.10 The phrase “if specified” means the specifier may have included a requirement in Contract Documents for which there is no default requirement in this Specification.

1.3—Definitions

acceptable or **accepted**—determined by Architect/Engineer to be in compliance with Contract Documents.

acceptance—acknowledgment by Architect/Engineer that submittal or completed Work is acceptable.

Architect/Engineer—the architect, engineer, architectural firm, designing, or engineering firm developing Contract Documents, or administering the Work under Contract Documents, or both.

architectural concrete—concrete that is typically exposed to view, or is indicated as architectural concrete in Contract Documents, and therefore requires special care in selection of the concrete materials, forming, placing, and finishing to obtain the desired architectural appearance.

bracing—temporary supplemental members used to avoid local or global instability during construction, evaluation, or repair that are intended to be removed after completion of construction.

bruised surface—a surface layer weakened by interconnected microcracks in concrete substrates caused by use of high-impact, mechanical methods for concrete removal and surface preparation; fracture layer typically extends to a depth of 3 to 10 mm (1/8 to 3/8 in.) and, if not removed, frequently results in lower bond strengths compared to surfaces prepared with nonimpact methods.

cast-in-place concrete—concrete that is deposited and allowed to harden in the place where it is required to be in the completed structure, as opposed to precast concrete.

construction joint (repair material)—the interface where two successive placements of repair material meet.

Contract Documents—set of documents that form the basis of a contractual relationship between an Owner and Constructor or Design-Builder. These documents are defined by the contractual agreement, and can contain contract forms, contract conditions, specifications, drawings, addenda, and contract changes.

Contractor—the person, firm, or entity under contract for construction of the Work.

delamination—a planar separation in a material that is roughly parallel to the surface of the material.

drawings—graphic presentations that detail requirements for Work and may include written notes.

formwork, engineer-designed—formwork that is required by the Contract Documents to be designed by a specialty engineer

formwork, non-engineer-designed—formwork that is not required by the Contract Documents to be designed by a specialty engineer

install—operations at the Project site including the actual unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

lightweight concrete—structural concrete containing lightweight aggregate conforming to ASTM C330/C330M and having an equilibrium density, as determined by ASTM C567/C567M, between 1440 and 1840 kg/m^3.

microcrack—crack too small to be seen by the unaided eye.

national standards body—organization whose primary activities are developing, coordinating, promulgating, revising, amending, reissuing, interpreting, or otherwise producing technical standards that are intended to address the needs of a group of affected adopters.

normalweight concrete—structural concrete containing aggregate that conforms to ASTM C33/C33M and that typically has a density between 2160 and 2560 kg/m^3.

Owner—the corporation, association, partnership, individual, public body, or authority for whom the Work is constructed.

post-tensioning—a method of prestressing reinforced concrete in which tendons are tensioned after the concrete has attained a specified minimum in-place strength or a specified minimum age.

precast concrete—concrete cast elsewhere than its final position.

provide—furnish and install, complete, and ready for the intended use.

quality assurance—actions taken by an organization to provide and document assurance that what is being done and what is being provided are in accordance with the Contract Documents and standards of good practice for the Work.

quality control—actions taken by an organization to provide control and documentation over what is being done and what is being provided so that the applicable standard of good practice or the Contract Documents for the work are followed.

reference specification—a standardized mandatory-language document prescribing materials, dimensions, and workmanship, incorporated by reference in Contract Documents.

reference standards—standardized mandatory-language documents of a technical society, organization, or association, including codes of local or federal authorities, which are incorporated by reference in Contract Documents.

rehabilitation—repairing or modifying an existing structure to a desired useful condition.

repair—the reconstruction or renewal of concrete parts of an existing structure for its maintenance or to correct deterioration, damage, or faulty construction of members or systems of a structure

required—mandatory in this Specification or Contract Documents.

shop drawing—drawings that provide details for a portion of Work that are prepared by Contractor in accordance with Contract Documents and are reviewed by Architect/Engineer.

specialty engineer—licensed design professional retained by a Contractor to design a delegated portion of the project.

specifications—the written document that details requirements for Work.

shoring—(1) props or posts of timber or other material in compression used for the temporary support of excavations, formwork, or unsafe structures; (2) the process of erecting shores.

strength test—standard test conducted for evaluation and acceptance of concrete determined as the average of the