

FIELD REFERENCE MANUAL

**Specifications for
Concrete Construction
ACI 301-20**

with selected ACI references

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CONTENTS

301-20	Specifications for Concrete Construction
117-10(15)	Specifications for Tolerances for Concrete Construction (ACI 117-10) and Materials and Commentary
117.1R-14	Guide for Tolerance Compatibility in Concrete Construction
211.5R-14	Guide for Submittal of Concrete Proportions
224.1R-07	Causes, Evaluation, and Repair of Cracks in Concrete Structures
302.1R-15	Guide for Concrete Floor and Slab Construction
302.2R-06	Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials
303R-12	Guide to Cast-in-Place Architectural Concrete Practice
304R-00(09)	Guide for Measuring, Mixing, Transporting, and Placing Concrete
304.2R-17	Guide to Placing Concrete by Pumping Methods
304.4R-20	Guide to Placing Concrete with Belt Conveyors
305R-20	Guide to Hot Weather Concreting
305.1-14(20)	Specification for Hot Weather Concreting
306R-16	Guide to Cold Weather Concreting
306.1-90(02)	Standard Specification for Cold Weather Concreting
308R-16	Guide to External Curing of Concrete
308.1-11	Specification for Curing Concrete
309R-05	Guide for Consolidation of Concrete
311.6-18	Specification for Testing Ready-Mixed Concrete
347R-14	Guide to Formwork for Concrete
347.3R-13	Guide to Formed Concrete Surfaces
364.17T	TechNote: How to Measure pH of a Concrete Surface Prior to Installation of a Floor Covering
423.7-14	Specification for Unbonded Single-Strand Tendon Materials
ITG-7-09	Specification for Tolerances for Precast Concrete

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Specifications for Concrete Construction

An ACI Standard

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This is a Reference Specification that the Architect/Engineer can apply to projects involving concrete construction by citing it in the Project Specification. A mandatory requirements checklist and an optional requirements checklist 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 five sections of this Specification cover general requirements for concrete construction. These sections cover materials and proportioning of concrete; reinforcement and prestressing steel; production, placing, finishing, and curing of concrete; formwork performance criteria and construction; treatment of joints; embedded items; repair of surface defects; and finishing of formed and unformed surfaces. Provisions governing testing, evaluation, and acceptance of concrete as well as acceptance of the structures are included. The remaining sections are devoted to architectural concrete, lightweight concrete, mass concrete, post-tensioned concrete, shrinkage-compensating concrete for interior slabs, industrial floor slabs, tilt-up construction, precast structural concrete, and precast architectural concrete.

The materials, processes, quality control measures, and inspections described in this document should be tested, monitored, or performed as applicable only by individuals holding the appropriate ACI Certification or equivalent.

Keywords: architectural concrete; cold weather; compressive strength; consolidation; curing; durability; finish; formwork; grouting; hot weather; industrial floors; inspection; joints; lightweight concrete; mass concrete; mixture proportions; placing; post-tensioned concrete; precast concrete; prestressing steel; repair; reshoring; shoring; shrinkage-compensating concrete; slabs-on-ground; steel reinforcement; testing; tilt-up; tolerance; welded wire reinforcement.

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CONTENTS

SECTION 1—GENERAL REQUIREMENTS, p. 3

- 1.1—Scope, p. 3
- 1.2—Interpretation, p. 3
- 1.3—Definitions, p. 3
- 1.4—Referenced standards, p. 5
- 1.5—Submittals, p. 8
- 1.6—Preconstruction conference, p. 8
- 1.7—Testing and inspection, p. 8
- 1.8—Acceptance of structure, p. 10
- 1.9—Protection of in-place concrete, p. 11

SECTION 2—FORMWORK AND FORMWORK ACCESSORIES, p. 12

- 2.1—General, p. 12
- 2.2—Products, p. 12
- 2.3—Execution, p. 13

SECTION 3—REINFORCEMENT AND REINFORCEMENT SUPPORTS, p. 14

- 3.1—General, p. 14
- 3.2—Products, p. 15
- 3.3—Execution, p. 16

SECTION 4—CONCRETE MIXTURES, p. 18

- 4.1—General, p. 18
- 4.2—Products, p. 19
- 4.3—Execution, p. 24

SECTION 5—HANDLING, PLACING, AND CONSTRUCTING, p. 24

- 5.1—General, p. 24
- 5.2—Products, p. 25
- 5.3—Execution, p. 25

SECTION 6—ARCHITECTURAL CONCRETE, p. 29

- 6.1—General, p. 29
- 6.2—Products, p. 30
- 6.3—Execution, p. 31

SECTION 7—LIGHTWEIGHT CONCRETE, p. 32

- 7.1—General, p. 32
- 7.2—Products, p. 32
- 7.3—Execution, p. 32

SECTION 8—MASS CONCRETE, p. 32

- 8.1—General, p. 32

8.2—Products, p. 33

8.3—Execution, p. 33

SECTION 9—POST-TENSIONED CONCRETE, p. 33

- 9.1—General, p. 33
- 9.2—Products, p. 35
- 9.3—Execution, p. 36

SECTION 10—SHRINKAGE-COMPENSATING CONCRETE FOR INTERIOR SLABS, p. 39

- 10.1—General, p. 39
- 10.2—Products, p. 39
- 10.3—Execution, p. 40

SECTION 11—INDUSTRIAL FLOOR SLABS, p. 40

- 11.1—General, p. 40
- 11.2—Products, p. 40
- 11.3—Execution, p. 41

SECTION 12—TILT-UP CONSTRUCTION, p. 42

- 12.1—General, p. 42
- 12.2—Products, p. 42
- 12.3—Execution, p. 42

SECTION 13—PRECAST STRUCTURAL CONCRETE, p. 44

- 13.1—General, p. 44
- 13.2—Products, p. 45
- 13.3—Execution, p. 48

SECTION 14—PRECAST ARCHITECTURAL CONCRETE, p. 50

- 14.1—General, p. 50
- 14.2—Products, p. 51
- 14.3—Execution, p. 53

(Nonmandatory information follows)

NOTES TO SPECIFIER, p. 53

- General notes, p. 53
- Foreword to checklists, p. 54
- Authored references, p. 55

MANDATORY REQUIREMENTS CHECKLIST, p. 56

OPTIONAL REQUIREMENTS CHECKLIST, p. 59

SECTION 1—GENERAL REQUIREMENTS

1.1—Scope

1.1.1 This Specification covers construction of cast-in-place concrete, architectural concrete, lightweight concrete, mass concrete, post-tensioned concrete, shrinkage-compensating concrete for interior slabs, industrial floor slabs cast on ground, tilt-up construction, precast structural concrete, and precast architectural concrete.

1.1.2 Unless otherwise specified, Sections 1 through 5 apply to Work where this Specification is referenced. Work covered by Sections 6 through 14 apply only if that Work is designated in Contract Documents.

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

1.1.4 This Specification governs for construction within its scope. If there are differences between requirements of this Specification and project-specific Contract Documents, project-specific Contract Documents govern.

1.1.5 Use shotcrete as designated in Contract Documents.

1.1.6 *Work not specified*—The following Work is not in the scope of this Specification:

- (a) Manufactured concrete products specified by ASTM standards
- (b) Environmental concrete structures
- (c) Heavyweight shielding concrete
- (d) Paving concrete
- (e) Terrazzo
- (f) Insulating concrete
- (g) Refractory concrete
- (h) Nuclear containment structures
- (i) Concrete piles; drilled piers; and caissons assigned to Seismic Design Categories A, B, and C
- (j) Fire safety
- (k) Slipformed concrete walls
- (l) Residential post-tensioned slabs-on-ground

1.1.7 This Specification governs if there is a conflict with referenced materials and testing standards.

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

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

1.1.10 *Units*—Values in this Specification are stated in inch-pound units. A companion specification in SI units is available.

1.1.11 Unless otherwise stated, the inch-pound system of units is applicable to ASTM combined standards referenced in this Specification.

1.1.12 The Notes to Specifier 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 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.

1.2.1.4 Notes to a table 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 note to a table.

1.2.1.5 If 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:

- (a) “and” indicates that all the connected items, conditions, requirements, or events apply.
- (b) “or” indicates that the connected items, conditions, requirements, or events apply singularly.

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

1.2.1.7 The phrases “as indicated in Contract Documents” and “as designated in Contract Documents” mean the specifier included provision requirements in Contract Documents.

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

1.2.1.9 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 to be satisfactory by Architect/Engineer based on requirements of Contract Documents.

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

ACI Concrete Field Testing Technician Grade I—a person who has demonstrated knowledge and ability to perform and record the results of ASTM standard tests on freshly mixed concrete and to make and cure test specimens; knowledge and ability shall be demonstrated by passing prescribed written and performance examinations and having credentials that are current with the American Concrete Institute.

Architect/Engineer—Architect, Engineer, architectural firm, design or engineering firm, or architectural and engineering firm issuing Contract Documents, or administering the Work under Contract Documents, or both.

backshores—shores placed snugly under a concrete slab or structural member after the original formwork and shores have been removed from a small area at a time, without allowing the slab or member to deflect, or support its own weight or existing construction loads.

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.

check test—test performed to verify result of previous test result of freshly-mixed concrete.

Contract Documents—a set of documents that form the basis of an agreement between Owner and Contractor; these documents can contain contract forms, contract conditions, specifications, drawings, addenda, and contract changes.

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

defective work—construction or material that does not comply with Contract Documents.

design reference sample—sample of architectural concrete for color, finish, and texture that is submitted for initial verification of design intent.

drawings—graphic presentation that details requirements for Work.

duct—a conduit in a concrete member to accommodate the prestressing steel of a post-tensioning tendon and provide an annular space for protective coating.

encapsulated tendon—a tendon that is enclosed completely in a watertight covering from end to end, including anchorages, sheathing with coating, and caps over the strand tails.

equivalent diameter of bundle—the diameter of a circle having an area equal to the sum of the bar areas in a bundle of reinforcing bars.

expansive cement—a cement that, when mixed with water, produces a paste that, after setting, increases in volume and is used to compensate for volume decrease due to shrinkage or to induce tensile stress in reinforcement.

exposed to view—portion of structure that can be observed by the public during normal use.

high-early-strength concrete—concrete that, through the use of additional cement, high-early-strength cement, admixtures, or other acceptable methods, has accelerated early-age strength development.

jack clearance—minimum space required to safely install, operate, and remove a hydraulic jack through its full range of movement in stressing of a tendon.

licensed design engineer—an individual retained by the Contractor who is licensed to practice engineering as defined by the statutory requirements of the professional licensing laws of the state or jurisdiction in which the project is to be constructed.

movement joint—an interface between adjacent portions of Work that allows movement in one or more direction.

nonencapsulated tendon—a tendon that has bare metallic anchorages and sheathing that is continuous between anchorages but not connected to the anchorages.

normalweight concrete—concrete containing aggregate that conforms to [ASTM C33/C33M](#) and that typically has a density between 135 and 160 lb/ft³.

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

placing drawing—drawing that gives size, location, and spacing of reinforcement, and other information required for site-cast concrete construction.

point of delivery—location where concrete is discharged from the vehicle used to transport concrete to the project site.

point of placement—location where concrete is placed in structure.

prestressing steel—high-strength steel element; for example, strand, bars, or wire, used to impart prestress forces to concrete.

quality assurance—actions taken by Owner or Owner's Representative to provide confidence that Work done and materials provided are in accordance with Contract Documents.

quality control—actions taken by Contractor to ensure that Work meets the requirements in Contract Documents.

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

referenced 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.

required—required in this Specification or in Contract Documents.

reshores—shores placed snugly under a stripped concrete slab or other structural member after the original forms and shores have been removed from a large area, thus requiring the new slab or structural member to deflect and support its own weight and existing construction loads.

sheathing—a material encasing prestressing reinforcement to prevent bonding of prestressing reinforcement with surrounding concrete, to provide corrosion protection, and to contain corrosion-inhibiting coating.

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

shore—vertical or inclined support members designed to support the weight of the formwork, concrete, and construction loads above.

strength test—standard test conducted for evaluation and acceptance of concrete determined as the average of the compressive strengths of at least two 6 x 12 in. cylinders or at least three 4 x 8 in. cylinders made from the same sample of concrete, taken in accordance with [ASTM C172/C172M](#) at the point of delivery, handled and standard cured in accordance with [ASTM C31/C31M](#), and tested in accordance with [ASTM C39/C39M](#) at 28 days or at test age designated for f'_c .

structural concrete—plain or reinforced concrete in a member required to transfer gravity loads, lateral loads, or both, to the ground.

submit—provide to Architect/Engineer for review.

submittal—documents or materials provided to Architect/Engineer for review and acceptance.

surface defects—imperfections in concrete surfaces defined in Contract Documents requiring repair.

tendon—in pretensioned applications, the tendon is the prestressing steel; in post-tensioned applications, the tendon is a complete assembly consisting of anchorages, prestressing steel, and sheathing with coating for unbonded applications or ducts with grout for bonded applications.