

An ACI/PTI Standard

Post-Tensioned Structural Concrete— Code Requirements and Commentary

Reported by Joint ACI-PTI Committee 320

ACI/PTI CODE-320-25



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POST-TENSIONING INSTITUTE
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Post-Tensioned Structural Concrete—Code Requirements and Commentary

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Post-Tensioned Structural Concrete— Code Requirements and Commentary

An ACI/PTI Standard
Reported by Joint ACI-PTI Committee 320

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PREFACE TO ACI/PTI CODE-320-25

The “Post-Tensioned Structural Concrete—Code Requirements and Commentary” (“Code”) provides minimum requirements for the materials, design, and detailing of post-tensioned concrete buildings and, where applicable, nonbuilding structures. This Code was developed by using a consensus process and addresses structural concrete members and systems that contain post-tensioned tendons. The Technical Advisory Board Code Task Group of the Post-Tensioning Institute was instrumental in the development of code provisions and commentary for this Code and whose efforts are gratefully acknowledged. Among the subjects covered are: design and construction for strength, serviceability, and durability; one-way slabs; two-way slabs; beams; post-tensioning anchorages; construction document information; and field inspection and testing.

This Code adheres to the chapter and section numbering of ACI CODE-318-25 and either references or repeats applicable provisions from ACI CODE-318. Provisions that are identical to ACI CODE-318 and are repeated in this Code are denoted with an equal sign (“=”). Provisions that are applicable to post-tensioned concrete but are not repeated in the Code are denoted as “See ACI CODE-318.” The Code organization is such that all design and detailing requirements for structural systems or for individual members are presented in chapters devoted to those individual subjects, and the chapters are arranged in a manner that generally follows the process and chronology of design and construction. Information and procedures that are common to the design of multiple member types are located in utility chapters. Within chapters, the terms “out of scope” are used for numbered section headings from ACI CODE-318 that are not covered by this Code, while the term “intentionally left blank” is used as a place holder to maintain consistency with section numbering in situations where ACI CODE-318 includes a numbered provision that is not also in this Code.

Uses of the Code include adoption by reference in a general building code, and earlier editions have been widely used in this manner. The Code is written in a format that allows such reference without change to its language. Therefore, background details or suggestions for carrying out the requirements or intent of the Code provisions cannot be included within the Code itself. The Commentary is provided for this purpose. Some considerations of the committee in developing the Code are discussed in the Commentary, with emphasis given to the explanation of new or revised provisions. The commentary also provides explanations regarding situations where use of ACI CODE-318 and this Code are used. For instance, design of cast-in-place, nonprestressed concrete members or structures requires the use of ACI CODE-318 alone. Design of post-tensioned concrete structures requires the use of this Code and ACI CODE-318. Design of precast, post-tensioned concrete structures requires the use of applicable provisions of this Code, ACI CODE-318, and ACI-PTI CODE-319. For provisions that specifically address precast concrete and are generally not within the scope of post-tensioning, this code references either ACI CODE-318 or ACI-PTI CODE-319, where applicable.

Much of the research data referenced in preparing the Code is cited for the user desiring to study individual questions in greater detail. Other documents that provide suggestions for carrying out the requirements of the Code are also cited, including PTI design manuals, recommended practices, and reports.

INTRODUCTION

ACI/PCI CODE-320-25, “Post-Tensioned Structural Concrete—Code Requirements and Commentary,” hereinafter called the Code or the 2025 Code, and its “Commentary,” are presented in a side-by-side column format. These are two separate but coordinated documents, with Code text placed in the left column and the corresponding Commentary text aligned in the right column. Commentary section numbers are preceded by an “R” to further distinguish them from Code section numbers. The two documents are bound together solely for the user’s convenience. Each document carries a separate enforceable and distinct copyright.

As the name implies, “Post-Tensioned Structural Concrete—Code Requirements and Commentary” is meant to be used as part of a legally adopted building code and as such must differ in form and substance from documents that provide detailed specifications, recommended practice, complete design procedures, or design aids.

The Code is intended to cover all buildings of the usual types, both large and small. Requirements more stringent than the Code provisions may be desirable for unusual construction. The Code and Commentary cannot replace sound engineering knowledge, experience, and judgment.

A building code states only the minimum requirements necessary to provide for public health and safety. The Code is based on this principle. For any structure, the owner or the licensed design professional may require the quality of materials and construction to be higher than the minimum requirements necessary to protect the public as stated in the Code. However, lower standards are not permitted.

The Code has no legal status unless it is adopted by the government bodies having the police power to regulate building design and construction. Where the Code has not been adopted, it may serve as a reference to good practice even though it has no legal status.

The Code and Commentary are not intended for use in settling disputes between the owner, engineer-of-record, specialty engineer, architect, contractor, or their agents, subcontractors, material suppliers, or testing agencies. Therefore, the Code cannot define the contract responsibility of each of the parties in post-tensioned concrete construction. General references requiring compliance with the Code in the project specifications should be avoided because the contractor is rarely in a position to accept responsibility for design details or construction requirements that depend on a detailed knowledge of the design. Design-build construction contractors, however, typically combine the design and construction responsibility. In post-tensioned concrete structures, either all or a portion of the design work is sometimes delegated to the contractor who retains a specialty engineer to perform such design work. The division of responsibility between the engineer-of-record and the specialty engineer must be clearly defined in the contract documents. ACI PRC-132-14 provides guidance to the engineer of record

regarding the details needed to address delegated design in the contract documents. Generally, the contract documents should contain all of the necessary requirements to ensure compliance with the Code. In part, this can be accomplished by reference to specific Code sections in the project specifications. Other ACI publications, such as “Specifications for Structural Concrete (ACI SPEC-301)” are written specifically for use as contract documents for construction.

The Commentary discusses some of the considerations of Committee 320 in developing the provisions contained in the Code. Emphasis is given to the explanation of new or revised provisions that may be unfamiliar to Code users. Comments on specific provisions are made under the corresponding chapter and section numbers of the Code.

The Commentary is not intended to provide a complete historical background concerning the development of the Code, nor is it intended to provide a detailed résumé of the studies and research data reviewed by the committee in formulating the provisions of the Code. However, references to some of the research data are provided for those who wish to study the background material in depth.

The Commentary directs attention to other documents that provide suggestions for carrying out the requirements and intent of the Code. However, those documents and the Commentary are not a part of the Code.

The Commentary is intended for the use of individuals who are competent to evaluate the significance and limitations of its content and recommendations, and who will accept responsibility for the application of the information it contains. ACI and PTI disclaims any and all responsibility for the stated principles. ACI and PTI shall not be liable for any loss or damage arising therefrom. Reference to the Commentary shall not be made in construction documents. If items found in the Commentary are desired by the licensed design professional to be a part of the contract documents, they shall be restated in mandatory language for incorporation by the licensed design professional.

It is recommended to have the materials, processes, quality control measures, and inspections described in this document tested, monitored, or performed by individuals holding the appropriate ACI Certification or equivalent, when available. The personnel certification programs of the American Concrete Institute and the Post-Tensioning Institute; the plant certification programs of the Precast/Prestressed Concrete Institute, the Post-Tensioning Institute, and the National Ready Mixed Concrete Association; and the Concrete Reinforcing Steel Institute’s Voluntary Certification Program for Fusion-Bonded Epoxy Coating Applicator Plants are available for this purpose. In addition, “Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection” (ASTM E329-21) specifies performance requirements for inspection and testing agencies.

CHAPTER 1—GENERAL

CODE

1.1—Scope of ACI/PTI CODE-320

1.1.1 This chapter addresses:

- (a) General requirements of this Code
- (b) Purpose of this Code
- (c) Applicability of this Code
- (d) Interpretation of this Code
- (e) Definition and role of the building official and the licensed design professional
- (f) Construction documents
- (g) Testing and inspection
- (h) Approval of special systems of design, construction, or alternative construction materials

1.2—General

1.2.1 ACI/PCI CODE-320, “Building Code Requirements for Post-Tensioned Structural Concrete,” is hereafter referred to as “this Code.”

1.2.2 In this Code, the general building code refers to the building code adopted in a jurisdiction. When adopted, this Code forms part of the general building code.

1.2.3 The official version of this Code is the English language version, using inch-pound units, published by the American Concrete Institute and the Post-Tensioning Institute.

1.2.4 In case of conflict between the official version of this Code and other versions of this Code, the official version governs.

COMMENTARY

R1.1—Scope of ACI/PTI CODE-320

R1.1.1 The Code includes provisions for the design of post-tensioned concrete used for structural purposes and containing post-tensioned tendons and nonprestressed reinforcement.

Design and construction procedures used in cast-in-place, post-tensioned concrete members are similar to those of cast-in-place structural concrete that is nonprestressed and are designed using many of the same requirements that are included in **ACI CODE-318**. Because the Code and ACI CODE-318 share many common design requirements, the Code is formatted with section numbering that is parallel to that of ACI CODE-318.

For ease of use, a provision in the Code that is denoted with an equal sign (“=”) is the same as the corresponding provision in ACI CODE-318. Provisions that are applicable to post-tensioned concrete, but are not reproduced in the Code are denoted as “See ACI CODE-318”. Where requirements specific to post-tensioned are included in the Code and not ACI CODE-318, new sections are created to avoid misinterpretation.

The terms “out of scope” are used for numbered section headings from ACI CODE-318 that are not covered by the Code, while the term “intentionally left blank” is used as a placeholder to maintain consistency with section numbering in situations where ACI CODE-318 includes a numbered provision that is not also in the Code.

Design of precast, post-tensioned concrete structures requires the use of applicable provisions of the Code, ACI CODE-318, and **ACI/PCI CODE-319**. For provisions that specifically address precast concrete and are generally not within the scope of post-tensioned concrete, the Code references either ACI CODE-318 or ACI/PCI CODE-319, as applicable.

This chapter includes a number of provisions that explain where the Code applies and how it is to be interpreted.

R1.2—General

R1.2.1 The commentary refers to ACI/PCI CODE-320 as “the Code.”

R1.2.2 The American Concrete Institute and the Post-Tensioning Institute recommends that the Code be adopted in its entirety.

R1.2.3 ACI-PTI Committee 320 develops the Code in English, using inch-pound units. Based on that version, ACI-PTI Committee 320 approved a version in English using SI units.

CODE

1.2.5 This Code provides minimum requirements for the materials, design, construction, and strength evaluation of post-tensioned structural concrete members and systems in any structure designed and constructed under the requirements of the general building code.

1.2.6 Modifications to this Code that are adopted by a particular jurisdiction are part of the laws of that jurisdiction, but are not a part of this Code.

1.2.7 If no general building code is adopted, this Code provides minimum requirements for the materials, design, construction, and strength evaluation of members and systems in any structure within the scope of this Code.

1.3—Purpose

1.3.1 The purpose of this Code is to provide for public health and safety by establishing minimum requirements for strength, stability, serviceability, durability, and integrity of post-tensioned concrete structures.

1.3.2 This Code does not address all design considerations.

1.3.3 Construction means and methods are not addressed in this Code.

1.4—Applicability

1.4.1 This Code shall apply to post-tensioned concrete structures designed and constructed under the requirements of the general building code.

1.4.2 Provisions of this Code shall be permitted to be used for the assessment, repair, and rehabilitation of existing post-tensioned structures.

1.4.3 Applicable provisions of this Code shall be permitted to be used for structures not governed by the general building code.

COMMENTARY

R1.2.5 The Code provides minimum requirements and exceeding these minimum requirements is not a violation of the Code.

The licensed design professional may specify project requirements that exceed the minimum requirements of the Code.

R1.3—Purpose

R1.3.1 The Code provides a means of establishing minimum requirements for the design and construction of post-tensioned structural concrete, as well as for acceptance of design and construction of post-tensioned concrete structures by the building officials or their designated representatives.

The Code does not provide a comprehensive statement of all duties of all parties to a contract or all requirements of a contract for a project constructed under the Code.

R1.3.2 The minimum requirements in the Code do not replace sound professional judgment or the licensed design professional's knowledge of the specific factors surrounding a project, its design, the project site, and other specific or unusual circumstances to the project.

R1.4—Applicability

R1.4.2 Specific provisions for assessment, repair, and rehabilitation of existing concrete structures are provided in **ACI CODE-562** and **PTI DC80.3**. Existing structures in ACI CODE-562 are defined as structures that are complete and permitted for use.

R1.4.3 Structures such as arches, bins and silos, blast-resistant structures, chimneys, underground utility structures, gravity walls, and shielding walls involve design and construction requirements that are not specifically addressed by this Code. Many Code provisions, however, such as concrete quality and design principles, are applicable for these structures.

CODE

1.4.4 See **ACI CODE-318**

1.4.5 See ACI CODE-318

1.4.6 For one- and two-family dwellings, multiple single-family dwellings, townhouses, and accessory structures to these types of dwellings, the design and construction of slabs-on-ground in accordance with **ACI CODE-332** shall be permitted.

1.4.7 Out of scope

1.4.8 This Code does not apply to design and construction of slabs-on-ground, unless the slab transmits vertical loads or lateral forces from other portions of the structure to the soil.

1.4.9 This Code does not apply to the design of concrete members reinforced with fiber-reinforced polymer (FRP) bars.

1.4.10 This Code does not apply to the design and construction of tanks and reservoirs.

1.4.11 See ACI CODE-318

1.5—Interpretation

1.5.1 The principles of interpretation in this section shall apply to this Code as a whole unless otherwise stated.

1.5.2 This Code consists of chapters, including text, headings, tables, figures, footnotes to tables and figures, and referenced standards.

1.5.3 The Commentary consists of a preface, introduction, commentary text, tables, figures, and cited publications. The Commentary is intended to provide contextual informa-

COMMENTARY

R1.4.6 ACI CODE-332 addresses the design and construction of slabs-on-ground for limited residential construction applications.

The **2021 IBC** requires design and construction of residential post-tensioned slabs on expansive soils to be in accordance with **PTI DC 10.5** which provides requirements for slab-on-ground foundations, soil investigation, design, and analysis. Guidance for the design and construction of post-tensioned slabs-on-ground that are not on expansive soils can be found in **ACI PRC-360**. Refer to R1.4.8.

R1.4.8 Detailed recommendations for design and construction of slabs-on-ground and floors that do not transmit vertical loads or lateral forces from other portions of the structure to the soil are given in ACI PRC-360. This guide presents information on the design of slabs-on-ground, primarily industrial floors and the slabs adjacent to them. The guide addresses the planning, design, and detailing of the slabs. Background information on the design theories is followed by discussion of the soil support system, loadings, and types of slabs. Design methods are given for structural plain concrete, reinforced concrete, shrinkage-compensating concrete, and post-tensioned concrete slabs.

R1.4.9 **ACI CODE-440.11** provides requirements and recommendations for the design and limited applicability of concrete members reinforced with glass fiber-reinforced polymer (GFRP) bar reinforcement. The design of “hybrid” post-tensioned members with mixed reinforcement type (steel and FRP) and members strengthened with FRP are outside the scope of ACI/PCI CODE-320.

R1.4.10 Requirements and recommendations for the design and construction of tanks and reservoirs are given in **ACI CODE-350**, **ACI PRC-334.1**, and **ACI PRC-372**.

R1.5—Interpretation