IN-LB Inch-Pound Units

An ACI Standard

Requirements for Reinforced Concrete Chimneys—Code and Commentary

Reported by ACI Committee 307

ACI CODE-307-23

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Note: Special acknowledgments to R. Porthouse (deceased) and S. Richart (deceased) for their contributions to this Code.

This Code provides material, design, and detailing requirements for cast-in-place and precast reinforced concrete chimneys. It sets forth minimum loadings for design and contains methods for determining the concrete and reinforcement required to obtain the strength required by the loadings. The methods of analysis apply primarily to circular chimney walls, but guidance is included for applying the general principles to noncircular chimney walls.

Keywords: across-wind load; construction requirements; earthquake load; flexural strength; load combinations; reinforced concrete; reinforced concrete chimneys; structural design; thermal load; vortex shedding; windload.

CONTENTS

ACI CODE-307-23 supersedes ACI 307-08 and was approved by the ACI Standards Board for publication January 2023, and published September 2023. This Code was first published in 1954 under Committee 505 and revised in 1969, 1988, 1995, 1998, and 2008.

PREFACE

ACI CODE-307 is based on ACI 318-19 and ASCE/SEI 7-16. Updated requirements in ACI 318 and ASCE/SEI 7, as well as recent studies and research, have resulted in the following revisions of this Code:

(a) The Code has been reorganized to follow the current ACI 318 format as much as possible.
(b) Wind loads are based on a strength-level wind speed.
(c) The damping ratio at the strength-level wind speed for the across-wind load has been decreased from 4% to 2.5%.
(d) Seismic loading and detailing are consistent with ASCE/SEI 7.
(e) Foundation requirements are expanded and revised.

Refer to Appendix F for a more comprehensive list of changes.

This Code was developed by an ANSI-approved consensus process. This Code can supplement a current (ICC) building code, supplement the codes governing new and existing structures of a local jurisdiction authority, or act as a stand-alone code in a locality that has not adopted an existing building code.

CODE

CHAPTER 1—GENERAL

1.1—Scope

1.1.1 ACI 307 includes provisions for the structural design of nonprestressed cast-in-place and nonprestressed precast reinforced concrete chimneys.

1.2—General

1.2.1 ACI 307, "Requirements for Reinforced Concrete Chimneys—Code and Commentary," 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 This Code provides minimum requirements for the materials, design, construction, and strength evaluation of cast-in-place or nonprestressed precast reinforced concrete chimneys designed and constructed under the requirements of the general building code.

1.2.4 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.

1.2.5 If no general building code is adopted, this Code provides minimum requirements for the materials, design, construction, and strength evaluation of any reinforced concrete chimney 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, and durability of reinforced concrete chimneys.

1.3.2 This Code does not address all design considerations.

COMMENTARY

CHAPTER R1—GENERAL

R1.1—Scope

R1.1.1 The provisions apply to circular and noncircular reinforced concrete chimneys.

A precast reinforced concrete chimney is defined as a chimney constructed from precast reinforced concrete sections (360-degree sections only, which may include openings), assembled one on top of another, to form a self-supporting cantilevered structure. Vertical reinforcement and grout are placed in cores as the precast sections are erected to provide structural continuity and stability during construction and for the completed structure. The design of precast concrete chimneys incorporating post-tensioning of the segments is beyond the scope of this Code.

R1.2—General

R1.2.5 This Code applies to reinforced concrete chimneys having circular or noncircular cross sections.

This Code provides minimum requirements and exceeding these minimum requirements is not a violation of this Code. The licensed design professional is permitted to specify project requirements that exceed the minimum requirements of this Code.

R1.3—Purpose

R1.3.1 This Code provides a means of establishing minimum requirements for the design and construction of reinforced concrete chimneys as well as for acceptance of the design and construction of reinforced concrete chimneys by the building officials or their designated representatives.

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