ACI 117-10
(Reapproved 2015)

Specification for Tolerances for Concrete Construction and Materials (ACI 117-10) and Commentary (ACI 117R-10)

An ACI Standard

Reported by ACI Committee 117

American Concrete Institute®

First printing
June 2010
Errata as of June 27, 2017

American Concrete Institute®
Advancing concrete knowledge

Specification for Tolerances for Concrete Construction and Materials and Commentary

The technical committees responsible for ACI committee reports and standards strive to avoid ambiguities, omissions, and errors in these documents. In spite of these efforts, the users of ACI documents occasionally find information or requirements that may be subject to more than one interpretation or may be incomplete or incorrect. Users who have suggestions for the improvement of ACI documents are requested to contact ACI. Proper use of this document includes periodically checking for errata at **www.concrete.org/committees/errata.asp** for the most up-to-date revisions.

ACI committee documents are 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 material it contains. Individuals who use this publication in any way assume all risk and accept total responsibility for the application and use of this information.

All information in this publication is provided "as is" without warranty of any kind, either express or implied, including but not limited to, the implied warranties of merchantability, fitness for a particular purpose or non-infringement.

ACI and its members disclaim liability for damages of any kind, including any special, indirect, incidental, or consequential damages, including without limitation, lost revenues or lost profits, which may result from the use of this publication.

It is the responsibility of the user of this document to establish health and safety practices appropriate to the specific circumstances involved with its use. ACI does not make any representations with regard to health and safety issues and the use of this document. The user must determine the applicability of all regulatory limitations before applying the document and must comply with all applicable laws and regulations, including but not limited to, United States Occupational Safety and Health Administration (OSHA) health and safety standards.

Order information: ACI documents are available in print, by download, on CD-ROM, through electronic subscription, or reprint and may be obtained by contacting ACI.

Most ACI standards and committee reports are gathered together in the annually revised *ACI Manual of Concrete Practice* (MCP).

American Concrete Institute
38800 Country Club Drive
Farmington Hills, MI 48331
U.S.A.
Phone: 248-848-3700
Fax: 248-848-3701

www.concrete.org

ISBN 978-0-87031-379-0

A metric version of this document (ACI 117M-10) is available at **www.concrete.org**

ACI 117-10
(Reapproved 2015)

Specification for Tolerances for Concrete Construction and Materials (ACI 117-10) and Commentary (ACI 117R-10)

An ACI Standard

Reported by ACI Committee 117

Eldon G. Tipping
Chair

Scott Michael Anderson
Secretary

Scott M. Anderson	Allen Face	Donald M. Marks	David N. Peterson
Karl J. Bakke	Robert A. Halvorson	Ross S. Martin	William S. Phelan
David K. Ballast	Mark G. Josten	Steven W. McCrary	B. Duke Pointer
Bryan M. Birdwell	Richard L. Knox	Arthur W. McKinney	Peter J. Ruttura
Gregory P. Birley	Jeff L. LaRue	Colin T. Milberg	Michael J. Schneider
Thomas J. Downs	Michael W. Lee	William R. Nash	Bruce A. Suprenant
Ron Eldridge	Michael L. Leming	Bob Payne	Michael A. West

Specification synopsis: This specification provides standard tolerances for concrete construction and materials. This document is intended to be used by specification writers and ACI committees writing standards as the reference document for establishing tolerances for concrete construction and materials.

Commentary synopsis: This report is a commentary on the "Specification for Tolerances for Concrete Construction and Materials (ACI 117)." It is intended to be used with ACI 117 for clarity of interpretation and insight into the intent of the committee regarding the application of the tolerances set forth therein.

Keywords: architectural concrete; concrete; construction; drilled piers; formwork; foundation; mass concrete; pier; prestressed concrete; reinforced concrete; reinforcement; specification; splice; tilt-up concrete; tolerances.

ACI 117 Specification and Commentary are presented in a side-by-side column format, with code text placed in the left column and the corresponding commentary text aligned in the right column. To distinguish the specification from the commentary, the specification has been printed in Helvetica, which is the typeface for this paragraph.

The Commentary is printed in Times Roman, which is the typeface for this paragraph. Commentary section numbers are preceded by the letter "R" to distinguish them from specification section numbers. The commentary is not a part of ACI Specification 117-10.

ACI 117-10 supersedes ACI 117-06 and was adopted March 1, 2010 and published June 2010.

CONTENTS

INTRODUCTION

SPECIFICATION

COMMENTARY

This commentary pertains to "Specifications for Tolerances for Concrete Construction and Materials (ACI 117-10)." The purpose of the commentary is to provide an illustrative and narrative complement to the specification; it is not a part of the specification.

No structure is exactly level, plumb, straight and true. Tolerances are a means to establish permissible variation in dimension and location, giving both the designer and the contractor limits within which the work is to be performed. They are the means by which the designer conveys to the contractor the performance expectations upon which the design is based or that the project requires. Such specified tolerances should reflect design assumptions and project needs, being neither overly restrictive nor lenient.

Necessity rather than desirability should be the basis of selecting tolerances.

As the title "Specifications for Tolerances for Concrete Construction and Materials (ACI 117)" implies, the tolerances given are standard or usual tolerances that apply to various types and uses of concrete construction. They are based on normal needs and common construction techniques and practices. Specified tolerances at variance with the standard values can cause both increases and decreases in the cost of construction.

Economic feasibility—The specified degree of accuracy has a direct impact on the cost of production and the construction method. In general, the higher degree of construction accuracy required, the higher the construction cost, and the lower the degree of construction accuracy, the higher the cost of required repairs.

Relationship of all components—The required degree of accuracy of individual parts can be influenced by adjacent units and materials, joint and connection details, and the possibility of the accumulation of tolerances in critical dimensions.

Construction techniques—The feasibility of a tolerance depends on available craftsmanship, technology, materials, and project management.

Compatibility—Designers are cautioned to use finish and architectural details that are compatible with the type and anticipated method of construction. The finish and architectural details used should be compatible with achievable concrete tolerances.

SPECIFICATION

COMMENTARY

Contract document references

ACI specification documents—The following American Concrete Institute standards provide mandatory tolerance requirements for concrete construction and can be referenced in Contract Documents:

117	Specification for Tolerances for Concrete Construction and Materials and Commentary
ITG-7	Specification for Tolerances for Precast Concrete
301	Specifications for Structural Concrete
303.1	Standard Specification for Cast-in-Place Architectural Concrete
336.1	Specification for the Construction of Drilled Piers
TMS 602/530.1/ ASCE 6	Specification for Masonry Structures and Commentary

ACI informative documents—The documents of the following American Concrete Institute committees cover practice, procedures, and state-of-the-art guidance for the categories of construction as listed:

General Building	ACI 302, 303, 304, 305, 311, 315, 336, 347
Special Structures	ACI 207, 307, 313, 325, 332, 334, 358
Materials	211, 223
Other	228

SECTION 1—GENERAL REQUIREMENTS

SPECIFICATION

1.1—Scope

1.1.1 This specification designates standard tolerances for concrete construction.

1.1.2 The indicated tolerances govern unless otherwise specified.

Tolerances in this specification are for typical concrete construction and construction procedures and are applicable to exposed concrete and to architectural concrete. Materials that interface with or connect to concrete elements may have tolerance requirements that are not compatible with those contained in this document.

This specification does not apply to specialized structures, such as nuclear reactors and containment vessels, bins, prestressed circular structures, and single-family residential construction. It also does not apply to precast concrete or to shotcrete.

Tolerances for specialized concrete construction that is outside the scope of this specification shall be specified in Contract Documents.

1.1.3 A series of preconstruction tolerance coordination meetings shall be scheduled and held prior to the commencement of the Work. The Contractor, subcontractors, material suppliers, and other key parties shall attend. All parties shall be given the opportunity to identify any tolerance questions and conflicts that are applicable to the work with materials, prefabricated elements, and Work assembled/installed in the field by the Contractor.

1.2—Requirements

1.2.1 Concrete construction and materials shall comply with specified tolerances.

COMMENTARY

R1.1—Scope

R1.1.2 Specification of more restrictive tolerances for specialized construction, such as architectural concrete, often results in an increase in material cost and time of construction.

R1.1.3 Preconstruction tolerance coordination meetings provide an opportunity for key participants to identify and to resolve tolerance compatibility issues prior to construction.

R1.2—Requirements

An example of a specific application that uses a multiple of toleranced items that together yield a toleranced result is the location of the face of a concrete wall. The wall has a tolerance on location (Section 4.2.1), measured at the foundation of the wall, and is allowed to deviate from the specified plane (Sections 4.1 and 4.8.2). The application of the location tolerance (Section 4.2.1) cannot be used to increase the plumb tolerance contained in Section 4.1. Similarly, the tolerance on member thickness (Section 4.5) shall not be allowed to increase the tolerance envelope resulting from the application of Sections 4.1, 4.2.1, and 4.8.2. If the base of the wall is incorrectly located by the maximum amount allowed by Section 4.2.1, then the plumb tolerance (Section 4.1) dictates that the face of the wall move back toward the correct location, and at a rate that does not exceed the provisions of Section 4.8.2. Refer to Fig. R1.2.3.