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

An ACI Standard

Reported by ACI Committee 117



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Specification for Tolerances for Concrete Construction and Materials and Commentary

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

An ACI Standard

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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.

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CONTENTS

Introduction, p. 3**Section 1—General requirements, p. 5**

- 1.1—Scope
- 1.2—Requirements
- 1.3—Definitions
- 1.4—Referenced standards

Section 2—Materials, p. 13

- 2.1—Reinforcing steel fabrication and assembly
- 2.2—Reinforcement location
- 2.3—Placement of embedded items, excluding dowels in slabs-on-ground
- 2.4—Concrete batching
- 2.5—Concrete properties

Section 3—Foundations, p. 25

- 3.1—Deviation from plumb
- 3.2—Deviation from location
- 3.3—Deviation from elevation
- 3.4—Deviation from plane
- 3.5—Deviation from cross-sectional dimensions of foundations

Section 4—Cast-in-place concrete for buildings, p. 31

- 4.1—Deviation from plumb
- 4.2—Deviation from location
- 4.3—Not used
- 4.4—Deviation from elevation
- 4.5—Deviation from cross-sectional dimensions
- 4.6—Deviation from formed opening width or height
- 4.7—Deviation from relative elevations or widths for stairs
- 4.8—Deviation from slope or plane
- 4.9—Sawcut depth in slab-on-ground

Section 5—Cast-in-place concrete at interface with precast concrete (except tilt-up concrete), p. 45

- 5.1—Deviation from elevation—cast-in-place concrete
- 5.2—Deviation from location—cast-in-place concrete
- 5.3—Deviation from dimension—cast-in-place concrete
- 5.4—Deviation from plane at bearing surface—cast-in-place concrete measured over length or width of bearing surface

Section 6—Masonry, p. 51

This section has been removed.

Section 7—Cast-in-place, vertically slipformed building elements, p. 53

- 7.1—Deviation from plumb for buildings and cores
- 7.2—Horizontal deviation
- 7.3—Cross-sectional dimensions
- 7.4—Openings through elements
- 7.5—Embedded plates
- 7.6—Deviation from plumb for slipformed and jump-formed silos

Section 8—Mass concrete, p. 55

- 8.1—Deviation from plumb

- 8.2—Horizontal deviation
- 8.3—Vertical deviation
- 8.4—Cross-sectional dimension
- 8.5—Deviation from plane

Section 9—Canal lining, p. 57

- 9.1—Horizontal deviation
- 9.2—Vertical deviation
- 9.3—Cross-sectional dimensions

Section 10—Monolithic water-conveying tunnels, siphons, conduits, and spillways, p. 59

- 10.1—Horizontal deviation
- 10.2—Vertical deviation
- 10.3—Cross-sectional dimensions
- 10.4—Deviation from plane

Section 11—Cast-in-place bridges, p. 61

- 11.1—Deviation from plumb
- 11.2—Horizontal deviation
- 11.3—Vertical deviation
- 11.4—Length, width or depth of specified elements
- 11.5—Deviation from plane
- 11.6—Deck reinforcement cover
- 11.7—Bearing stiffeners

Section 12—Exterior pavements and sidewalks, p. 63

- 12.1—Horizontal deviation
- 12.2—Vertical deviation of surface

Section 13—Chimneys and cooling towers, p. 65

- 13.1—Deviation from plumb
- 13.2—Outside shell diameter
- 13.3—Wall thickness

Section 14—Cast-in-place nonreinforced pipe, p. 67

- 14.1—Wall thickness
- 14.2—Pipe diameter
- 14.3—Offsets
- 14.4—Surface indentations
- 14.5—Grade and alignment
- 14.6—Concrete slump

Section 15—Tilt-up concrete, p. 69

- 15.1—Panel forming
- 15.2—Deviation from plumb
- 15.3—Deviation from elevation
- 15.4—Deviation from location
- 15.5—Deviation from slope or plane
- 15.6—Deviation from relative widths

Notes to Specifier, p. 73

General notes

Foreword to checklists, p. 75**Mandatory Requirements Checklist, p. 75****Optional Requirements Checklist, p. 76**

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, procedure, 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.