IN-LB Inch-Pound Units

An ACI Standard

Load Testing of Concrete Structures—Code and Commentary

Reported by ACI Committee 437

ACI CODE-437.2-22

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American Concrete Institute
38800 Country Club Drive
Farmington Hills, MI 48331
Phone: +1.248.848.3700
Fax: +1.248.848.3701

www.concrete.org

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Paul H. Ziehl, Chair

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Jeffery S. West

Consulting Members

Marco Arduini
JoAnn P. Browning
Grant T. Halvorsen
Carl J. Larosche
Habib M. Zien Alabideen

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This Code provides requirements for test load magnitudes, test protocols, and acceptance criteria for conducting a load test as a means of evaluating the safety and serviceability of concrete structural members and systems of structures. A load test may be conducted as part of a structural evaluation to determine whether a structure requires repair and rehabilitation, or to verify the adequacy of repair and rehabilitation measures.

Keywords: acceptance criteria; cyclic loading; load test; monotonic loading; test load magnitude; test protocol.

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CODE

COMMENTARY

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CODE

CHAPTER 1—GENERAL

1.1—Scope

1.1.1 The scope, purpose, applicability, limitations, interpretation principles, and units of measure are defined in this chapter.

1.2—General

1.2.1 The requirements of this Code shall govern for the evaluation of safety and serviceability of members in concrete structures by load testing.

1.2.2 The requirements of this Code shall apply to reinforced concrete structures, or portions of reinforced structures, with prestressed reinforcement, nonprestressed reinforcement, or both.

1.2.3 Procedures and requirements provided in this Code are not applicable to structures having concretes with compressive strengths above 8000 psi unless permitted by the licensed design professional.

COMMENTARY

CHAPTER R1—GENERAL

R1.1—Scope

R1.1.1 A load test is required if the effect of a strength deficiency is not well understood, or it is not practicable to measure the dimensions and determine the material properties of the members required for analysis.

R1.2—General

R1.2.1 The determination of situations where a load test is required is outside the scope of this Code. Furthermore, this Code does not address procedures for analytical strength evaluations, condition evaluation of structures, or assessment of structural deterioration and its consequences. The licensed design professional should advise the owner and parties participating in the load testing of a structure of the potential for damage or even failure of the portions of the structure to be load tested in accordance with the procedures of this Code.

This Code may be used to evaluate whether a structure or a portion of a structure satisfies safety requirements. A strength evaluation may be required if the materials are considered deficient in quality, if there is evidence of faulty construction, if a structure will be used for a new function, or if, for any reason, a structure or a portion of it does not appear to satisfy safety requirements. In such cases, this Code provides minimum requirements for performing a strength evaluation of the structure by load testing.

If a load test is prescribed as part of the strength evaluation process, all parties should agree on the region to be loaded, the magnitude of the load, the load test protocol, and the applicable acceptance criteria before conducting the load test. If the safety concerns are related to an assemblage of members or an entire structure, it may not be feasible to load test every member and section. In such cases, an investigation plan should be developed to address the specific safety concerns.

R1.2.2 If there is doubt or concern about the shear strength of a member or members, or the development of reinforcement, a load test may be the most efficient solution to confirm the safety of the member or structure.

A load test may also be appropriate if it is not feasible to determine the material properties and structural dimensions required for analysis, even if the cause of the concern relates to flexure or axial load.

R1.2.3 Experience is lacking in the application of the procedures and requirements in this Code to structures having high-strength concrete—that is, compressive strengths over 8000 psi as defined in ACI 363R. Structures or members constructed of high-strength concrete may exhibit a response that is nearly linear as the structure approaches its load-carrying limit and, therefore, may provide little warning of an impending failure. Structures or members constructed of high-strength concrete may also experience a more brittle

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