

Designing Concrete Structures:

Evaluation of Concrete Cores Test Results According to ACI 318-19



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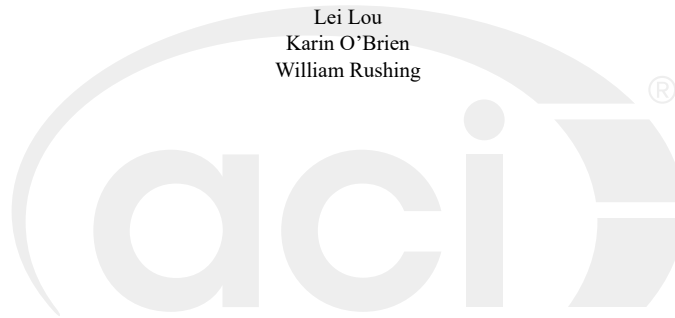
Katelyn Low, Chair

John Aidoo
Bryan Castles
Om Dixit
Claude Goguen
Todd Hawkinson

*Primary author

Kimberly Kramer
Carl Larosche
Lei Lou
Karin O'Brien
William Rushing

Luke Snell*
Lawrence Taber
Jairo Uribe
Hartanto Wibowo
Kari Yuers



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This document is intended as a voluntary field guide for the Owner, design professional, and concrete repair contractor. It is not intended to relieve the user of this guide of responsibility for a proper condition assessment and structural evaluation of existing conditions, and for the specification of concrete repair methods, materials, or practices by an experienced engineer/designer.

ACI E702.8-22 Evaluation of Concrete Cores Test Results According to ACI 318-19, "Building Code Requirements for Structural Concrete and Commentary".

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Introduction

This document will present three separate case studies with different concrete core test data and perform an evaluation according to Section 26.12.6 of ACI 318-19, “Building Code Requirements for Structural Concrete and Commentary,” to determine if concrete core test results from placed concrete meets adequate strength as described in ACI 318 for a member’s specified concrete compressive strength.

There are many reasons why cores may be taken. Cores may be required because the cylinders were never made, lost, damaged, or improperly cured; to investigate other properties of the concrete; or, in our case, the tested cylinders were below the required strength. The licensed design professional or the building official is instructed to take cores in extreme cases. Cores to evaluate the concrete strength are to be taken when the structural adequacy is in question and when calculations indicate that the documented strength is not considered to be adequate. In the Code commentary, it is also discussed that lower strength may be tolerated and the licensed design professionals or the building official should consider if cores are required. In these examples, the licensed design professional determined the compressive cylinder strengths indicated that the structural integrity of the suspended slab was in question and required coring to evaluate the concrete.

Problem Statement for Case No. 1, 2, and 3 (all cases)

The compressive strength of the concrete cylinders in one area of a suspended slab did not meet the strength acceptance criteria. The licensed design professional required that cores be taken to evaluate the strength of the concrete (ACI 318-19, 26.12.3.1(a) 26.12.3.1(c)).

The project specifications state that the compressive strength is to be 4000 psi at 28 days. The cores were removed from the slab 45 days after the concrete was placed.

Note: Example of determining acceptance of concrete compressive strength test results can be found in ACI E702.3-21, “Designing Concrete Structures: Acceptance of Concrete Compressive Strength Test Results According to ACI 318-19.”

Assumptions	Reference
Removal of the cores were done per ASTM C42/C42M “Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.”	ACI 301, 1.7.4.3(a)
Cores were tested by procedures outline in ASTM C42/C42M.	ACI 301, 1.7.5.2
The locations of the cores were in the areas of the suspected low-strength concrete.	ACI 301, 1.7.4.3(b)

Note: Although the Code does not state this as a requirement, the licensed design professional or the building official should be involved in determining the core locations. They have the responsibility of determining if the core results meet the Code requirements, and they should make certain reasonable coring locations were used.

Assumptions	Reference
Certified laboratory technicians performed all required laboratory tests.	ACI 318, 26.12.1.1(d)
Cores were tested between 5 and 7 days after coring and the cores were trimmed.	ACI 318, 26.12.1.1(c)