# Assessment of in-place concrete strength according to the major standards

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## Summary

The evaluation of the structural capacity of existing structures and infrastructures requires the assessment of the actual in-place concrete strength. Direct and indirect methods to evaluate the concrete strength have been developed though the primary technique is the core test.

In order to estimate the structural capacity of an existing structure the experimental data obtained by testing of cores were used to evaluate the specified in-place compressive strength according to the main standards such as EN 13791 and ACI 214.4R. The results obtained were critically evaluated, compared, and analyzed to assess the in-place concrete quality according also to the statistical methods proposed in ISO 12491.

The procedures proposed by the standards studied give similar results though they are obtained following different approaches.

**Keywords:** Bayesian approach; concrete quality; core testing; in-place concrete compressive strengths; standards/guidelines/codes.

## 1. Introduction

Seismic vulnerability assessment of structures and infrastructures is a relevant topic. The assessment of the compressive strength is usually needed in evaluating the structural load-carrying capacity of an existing concrete structure or infrastructures. This value is used in accepted formulations of nominal strength which are expected to give capacities that may be compared, after multiplication by appropriate strength reduction factors, to the required strength of the structure under factored loads.

The most direct method to determine the compressive strength of concrete is the core testing. Nevertheless, the process of obtaining core specimens and interpreting the strength test results is often confounded by various factors that affect either the in-place strength of the concrete or the measured strength of the test specimen. The scatter in strength test data, which is unavoidable given the randomness of in-place concrete strengths and the additional uncertainty attributable to the preparation and testing of the specimen, may further complicate compliance.

Considerable research has been carried out concerning this topic [1-6]. Strength correction factors have been proposed to take into account the different effects [7, 8]. Different national and international standards, guidelines and codes are also available to provide guidance for evaluating the in-place compressive concrete strength from core tests that relies on statistical analysis techniques.

In order to give a contribution to this research area a well defined test program was planned and compressive tests on a set of core specimens taken from some test regions of an existing reinforced

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