Singapore Standards Council

SS EN 13791 : 2009 (2016)
EN 13791 : 2007, IDT

(ICS 91.080.40)

SINGAPORE STANDARD

Assessment of in-situ compressive strength in structures and precast concrete components

(This national standard is the identical implementation of EN 13791 : 2007 and is adopted with permission of CEN, Avenue Marnix 17, 1000 Brussels)

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Building and Construction Authority
GBAD Services Pte Ltd
Housing & Development Board
National University of Singapore
Setsco Services Pte Ltd
Singapore Concrete Institute
WAK Consultants Pte Ltd

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Contents

National Foreword

This Singapore Standard was prepared by the Technical Committee on Building Structure and Sub-structure under the purview of the Building and Construction Standards Committee.

This standard is identical to EN 13791 : 2007 'Assessment of in-situ compressive strength in structures and precast concrete components' with the addition of Annex ZZB – 'Additional guidance for Singapore users', and adopted with permission of CEN, Rue de Stassart 36, B-1050 Brussels. 100 mm and 150 mm cubes are the standard specimens for compressive strength testing in Singapore and Annex ZZB provides more specific guidance for use in Singapore. The principles are in agreement with those in EN 13791 : 2007.

Annex ZZB, prepared for Singapore users, is to be considered together with Annex ZZA (informative) – 'Additional guidance for UK users', adopted from BS EN 13791 : 2007.

Acknowledgement is made for the use of information from the above reference.

At the time of publication, this standard is expected to be used as a reference in the Building and Construction Authority's 'Approved document – Acceptable solutions'.

Attention is drawn to the possibility that some of the elements of this Singapore Standard may be the subject of patent rights. Enterprise Singapore shall not be held responsible for identifying any or all of such patent rights.

Introduction

This Singapore Standard provides techniques for estimating in-situ compressive strength in concrete structures and precast concrete components. Testing in-situ strength takes into account the effects of both the materials and execution (compaction, curing, etc.).

These tests do not replace concrete testing according to SS EN 206-1.

SS EN 206-1 refers to the guidance of this standard for assessing the strength in structures and precast concrete components.

The following examples illustrate where this estimate of in-situ strength of concrete may be required:

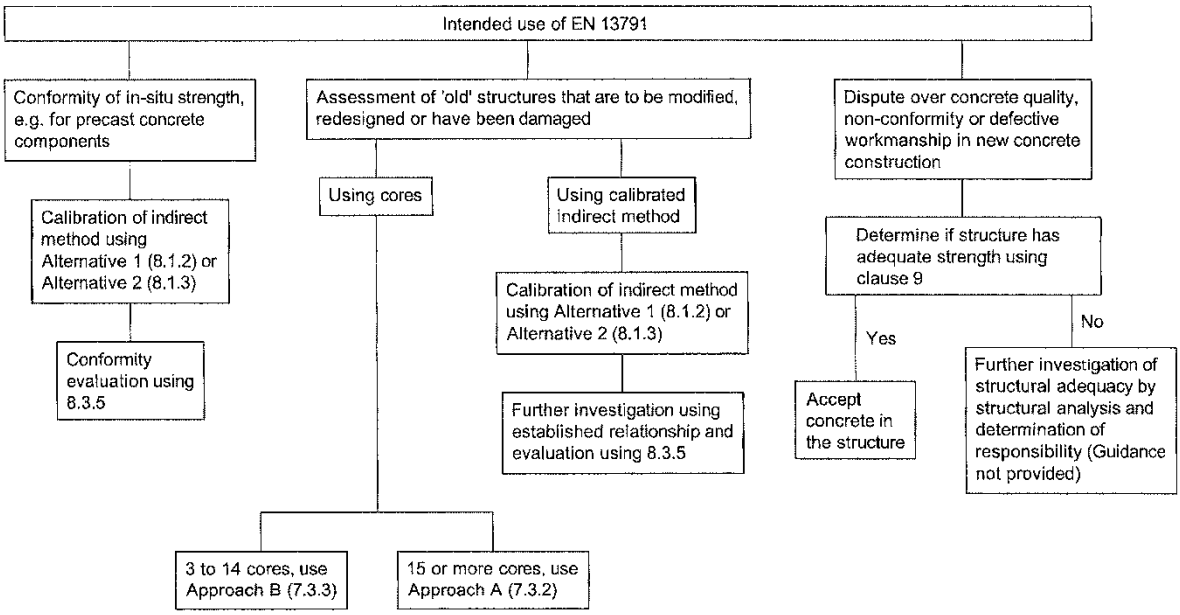
- when an existing structure is to be modified or redesigned;
- to assess structural adequacy when doubt arises about the compressive strength in the structure due to defective workmanship, deterioration of concrete due to fire or other causes;
- when an assessment of the in-situ concrete strength is needed during construction;
- to assess structural adequacy in the case of non-conformity of the compressive strength obtained from standard test specimens;
- assessment of conformity of the in-situ concrete compressive strength when specified in a specification or product standard.

Where identified in this standard, national provisions are permitted or required.

An outline of the procedures for these different uses of this standard is given in Flowchart 1.

For specific production conditions and constituent materials, development of economic design where permitted by national provisions may be possible through the assessing the partial safety factor, γ_c from knowledge of the in-situ compressive strength and the strength of standard test specimens.

When assessing compressive strengths in cases other than checking the quality of the concrete or the workmanship during execution or before accepting the structure for use, the appropriate reduction in the partial safety factor should be determined on a case-by-case basis according to national provisions.


Intended use of EN 13791
Conformity of in-situ strength, e.g. for precast concrete components
Assessment of 'old' structures that are to be modified, redesigned or have been damaged
Dispute over concrete quality, non-conformity or defective workmanship in new concrete construction
Calibration of indirect method using Alternative 1 (8.1.2) or Alternative 2 (8.1.3)
Using cores
Using calibrated indirect method
Determine if structure has adequate strength using clause 9
Conformity evaluation using 8.3.5
Calibration of indirect method using Alternative 1 (8.1.2) or Alternative 2 (8.1.3)
Yes
No
Further investigation using established relationship and evaluation using 8.3.5
Accept concrete in the structure
Further investigation of structural adequacy by structural analysis and determination of responsibility (Guidance not provided)
3 to 14 cores, use Approach B (7.3.3)
15 or more cores, use Approach A (7.3.2)

Flowchart 1

Assessment of in-situ compressive strength in structures and precast concrete components

1 Scope

This Singapore Standard:

- gives methods and procedures for the assessment of the in-situ compressive strength of concrete in structures and precast concrete components;
- provides principles and guidance for establishing the relationships between test results from indirect test methods and the in-situ core strength;
- provides guidance for the assessment of the in-situ concrete compressive strength in structures or precast concrete components by indirect or combined methods.

This Singapore Standard does not include the following cases:

- where indirect methods are used without correlation to core strength;
- assessment based on cores less than 50 mm in diameter;
- assessment based on less than 3 cores;
- use of microcores.

NOTE – In these cases provisions valid in place of use apply.

This Singapore Standard is not for the assessment of conformity of concrete compressive strength in accordance with SS EN 206-1 or EN 13369 except as indicated in SS EN 206-1 : 2009, 5.5.1.2 or 8.4.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

SS EN 206-1, Concrete – Part 1: Specification, performance, production and conformity

EN 12350-1, Testing fresh concrete – Part 1: Sampling

EN 12390-1, Testing hardened concrete – Part 1: Shape, dimensions and other requirements for specimens and moulds

EN 12390-2, Testing hardened concrete – Part 2: Making and curing specimens for strength tests

EN 12390-3, Testing hardened concrete – Part 3: Compressive strength of test specimens

EN 12504-1, Testing concrete in structures – Part 1: Cored specimens – Taking, examining and testing in compression

EN 12504-2, Testing concrete in structures – Part 2: Non-destructive testing – Determination of rebound number

EN 12504-3, Testing concrete in structures – Part 3: Determination of pull-out force

EN 12504-4, Testing concrete in structures – Part 4: Determination of ultrasonic pulse velocity