

In collaboration with



ASSOCIATION OF
CONSULTING ENGINEERS
SINGAPORE



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Dear Sir/Madam

STANDARDISED SAMPLING RATE - IDENTITY TESTING FOR COMPRESSIVE STRENGTH OF CONCRETE

Objective

This circular provides guidance to the construction industry on the standardised sampling rate in relation to identity testing for compressive strength of concrete.

Background

2 Today, all the ready-mixed concrete (RMC) plants supplying concrete for use in major building construction projects are certified by SAC¹-accredited certification bodies. As part of the certification, the RMC plants must carry out the relevant production control and conformity tests to ensure the concrete supplied to construction sites complies with the relevant standards such as SS EN 206. Under the RMC certification scheme since 2010, there is no major reported structural non-compliances or defects attributable to poor-quality concrete from the certified plants.

3 These outcomes demonstrate the maturity and reliability of the industry's quality assurance framework, providing confidence to optimise the current testing regime. Hence it is timely to review and streamline the sampling rates of identity testing for compressive

¹ Singapore Accreditation Council

strength of concrete adopted by the industry, given that all the RMC plants are certified. This initiative supports a broader shift towards more sustainable construction practices, with fewer materials used for testing and saving manpower.

Standardised Sampling Rate - Identity Testing for Compressive Strength

4 Where identity testing is to be performed, reference should be made to clause B.2(2), Annex B of SS EN 206. BCA has consulted industry stakeholders and took reference from international practices. The following minimum sampling rates is recommended as a common baseline for industry. These recommendations do not affect the responsibility of the Qualified Person (QP) to determine whether additional sampling is necessary based on engineering judgement, project complexity or specific quality concerns.

Table 1: Recommended Sampling Rate

Volume of Concrete Cast	Number of Samples Required
First 400 m ³	1 sample in 100 m ³
Subsequent volume of concrete up to 2,500 m ³	1 sample in 200 m ³
> 2,500 m ³	15 samples
For bored piles	At least 1 sample per pile

5 Each sample should consist of at least four specimens of cube, with two cubes for 7-day and 28-day testing respectively. An illustration of the number of samples required is shown in **Annex A**. Accordingly, BCA will be updating the Guidebook for Site Supervision Plan for Structural and Geotechnical Building Works on this matter.

6 Considerations for increasing cube sampling rate include: project complexity and the critical nature of specific structural elements such as transfer beams, long cantilevers, long-span beams, and deep foundations or heavily loaded elements. The determination of critical elements should take into account - structural complexity, load-critical components, risk assessments conducted by the QP, and the potential consequences in relation to structural safety.

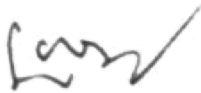
7 Additional cubes may also be required for other purposes such as strength verification of prestressed concrete prior to load transfer, determining appropriate formwork striking time, addressing concerns about concrete quality, conducting random verification tests on the concrete supplied, or testing special concretes such as high-strength, lightweight, or self-compacting concrete including any other such situations where concrete strength verification is required. The QP remains responsible for determining whether higher sampling frequencies are necessary to ensure compliance with the Building Control Regulations.

Use of 100mm Cubes for Identity Testing

8 Similar to conformity testing, SS 544-1 permits the use of 100 mm cube specimens for identity testing. The identity criteria for 100 mm cube specimens and 150 mm cube specimens are the same. There is significant environmental benefit in terms of material and transport impacts to using the smaller specimens as a 150 mm cube specimen contains over three times as much concrete as a 100 mm cube specimen. The adoption of 100 mm cubes for conformity and identity testing is recommended and encouraged. For further details, please refer to the National Foreword and Clause A.10 of SS 544-1.

For Clarification

9 We would appreciate if you could disseminate the contents of this circular to your members. Please contact us at Tel 1800-3425222 or through the online feedback form (<https://www.bca.gov.sg/feedbackform/>) should you need any clarification.



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ANNEX A - CONCRETE CUBE SAMPLES BASED ON THE STANDARDISED SAMPLING RATE

VOLUME CAST (m³)		NO. OF SAMPLES
FROM	TO	
1	100	1
101	200	2
201	300	3
301	400	4
401	500	5
501	600	5
601	700	6
701	800	6
801	900	7
901	1000	7
1001	1100	8
1101	1200	8
1201	1300	9
1301	1400	9
1401	1500	10
1501	1600	10
1601	1700	11
1701	1800	11
1801	1900	12
1901	2000	12
2001	2100	13
2101	2200	13
2201	2300	14
2301	2400	14
2401	2500	15
2501	2600	15
2601	2700	15
2701	2800	15
2801	2900	15
2901	3000	15