



TS 00148:1.0

Specification

Coring of Hardened Concrete

(ATS 5317-23, Ed 1.0 MOD)

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1.0	30 April 2025	First issue as TS 00148. Modified adoption of ATS 5317-23.

Preface

This document is the first issue as TS 00148, which adopts and modifies Austroads Technical Specification ATS 5317 as a TfNSW Specification. It sets out the requirements for the coring of hardened concrete for the purpose of assessing the in-situ concrete properties, including compressive strength, volume of permeable voids and density.

To enable industry preparation for the implementation of the requirements of this standard, there is a transitional period in place for the effective date of this document. This document will come into effect on 30 April 2025.

For the purposes of this document, where TfNSW has identically adopted, or adopted and modified, an ATS document as a Transport Standard, the corresponding Transport Standard should be applied.

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1. Scope

- 1.1 This Specification sets out the requirements for the coring of hardened concrete for the purpose of assessing the in-situ concrete properties, including compressive strength, volume of permeable voids and density. It does not apply to coring undertaken for purposes other than the assessment of concrete properties and it does not apply to sprayed concrete (refer ATS 5328).
- 1.2 Unless coring is specified in the Contract documents, this Specification only applies if the Principal accepts a proposal from the Contractor to take core samples or the Principal directs cores to be taken. The Principal is under no obligation to accept a proposal from the Contractor to take cores.

2. Referenced Documents

- 2.1 The following documents are referenced in this Specification:

Australian Standards

AS 1012.14	Methods of testing concrete. Method for securing and testing cores from hardened concrete for compressive strength and mass per unit volume
AS 1012.21	Methods of testing concrete. Determination of water absorption and apparent volume of permeable voids in hardened concrete
AS 1012.12.1	Determination of mass per unit volume of hardened concrete – Rapid measuring method
AS 1012.12.2	Determination of mass per unit volume of hardened concrete – Water displacement method

Austroads

ATS 5328	Sprayed Concrete
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TfNSW standards

TS 00079	Cementitious Patch Repair of Concrete – (ATS 5340-20, IDT)
TS 00146	Supply of Special Class Concrete – (ATS 5315 Ed 1 MOD)
TS 00147	Cementitious Mortar and Grout – (ATS 5316 Ed 1 MOD)

3. Definitions

3.1 The following definitions apply to this Specification:

- Professional Engineer:** A person who:
- a. is registered on any scheme of registration of engineers prescribed by legislation in the applicable jurisdiction;
 - b. is appropriately registered or prequalified if the Principal has implemented an applicable registration or prequalification scheme; and
 - c. satisfies at least one of the following requirements:
 - i. is a Chartered Professional Engineer; or
 - ii. holds a 4-year civil engineering degree from a university that is accredited under the Washington Accord and is registered in a relevant area of practice on the National Engineering Register in Australia.

VPV: volume of permeable voids

4. Quality System Requirements

4.1 If the Contractor wishes to undertake coring of hardened concrete or the Contractor is required to take cores, it must submit a Quality Plan (alternatively referred to as a “Coring Plan”) to the Principal which includes the documentation in Table 4.1.

Table 4.1: Quality Plan

Clause	Description of Document
5.1	Plan showing the accurate location and depth of each proposed core.
5.5	Certification from Professional Engineer (where applicable).
5.6	Name, experience and qualifications of the supervisor.
5.8	Details and procedures for undertaking the coring.
6.1, 7.1 and 8.1	Plan for method of assessment of cores (as applicable).

Note:

Refer to TS 00147 for details of the Quality Plan for core hole restoration.

HOLD POINT 1	
Process Held	Commencement of coring.
Submission Details	The Quality Plan must be submitted to the Principal at least 3 working days prior to the proposed commencement of coring.

4.2 If the Principal approves the Quality Plan, the Contractor must implement the Quality Plan in accordance with this Specification.

5. Coring

Core Location and Timing

- 5.1 Prior to coring, the Contractor must refer to the “As Constructed” drawings (where available) and locate the steel reinforcement or prestressing tendons using a concrete cover meter or ground penetrating radar (GPR). The equipment must be operated by a competent person. If requested by the Principal, the Contractor must provide evidence that the cover meter or GPR has been calibrated within the timeframe recommended by the manufacturer.
- 5.2 If achievable, the core hole must be positioned so that the distance between the core hole and the steel reinforcement or prestressing tendons is not less than the specified concrete cover. If this is not achievable, the core hole must be positioned so that it is equidistant from the nearest reinforcing or tendons. In locating core holes, the practicality of repair and permanency of repair must be considered.
- 5.3 Where coring is undertaken to verify the test results from cylinders cast from plastic concrete, the cores must be cut from the completed structural member, portion of member or group of members represented by the batch of concrete used in the test cylinder sample(s).
- 5.4 Where a core is cut from a concrete deck or slab, the core hole must be positioned so that is at least 300 mm from all wheel paths.
- 5.5 Cores must not be cut from prestressed concrete after any prestressing force has been applied, or transferred to the concrete, unless the proposed coring is certified by a Professional Engineer with at least 5 years of experience in the design of prestressed concrete structures. The certification must state that the proposed coring will not be detrimental to the prestressed concrete member and be included in the Contractor’s proposal.

Coring

- 5.6 At all times, coring must be undertaken under the direction of the supervisor, who must be suitably experienced in the operation of the coring equipment.
- 5.7 A positive stop device must be fitted to the coring machine, or a depth measurement device placed on the core barrel to ensure that the core hole does not exceed the specified depth

WITNESS POINT 1	
Process	Coring.
Notification Period	Notification must be submitted to the Principal at least 2 working days prior to the commencement of coring

- 5.8 The Quality Plan must include:
- a. details of the equipment; and
 - b. procedures for undertaking the drilling; including the details of the process to be implemented if existing steel reinforcement or a tendon is encountered.
- 5.9 The dimensions and testing of the concrete cores must be in accordance with AS 1012.14.
- 5.10 All cores must be clearly labelled to identify them with the structural member and location they represent.
- 5.11 Drilling of cores must not cause spalling, cracking, or other damage to the existing concrete, the steel reinforcement or other steel embeddings. Any damage to the concrete member (including the steel reinforcement) must be repaired in accordance with TS 00079.
- 5.12 If steel reinforcement or a tendon is encountered during the drilling operation, the Contractor must immediately cease coring and notify the Principal. Subject to the Principal's prior approval, the hole must be relocated, and the uncompleted core hole treated in accordance with Clause 5.14. Cores containing steel reinforcement must not be tested.
- 5.13 The Contractor must maintain complete records of all core drilling activities and submit the records to the Principal.

Restoration of Core Holes

- 5.14 All holes must be cleaned and restored in accordance with TS 00146.

6. Assessment of Compressive Strength

- 6.1 The following applies to any approved coring undertaken for the purpose of assessing concrete compressive strength:
- a. For each section of concrete to be tested, a minimum of 3 cores must be taken, tested and reported in accordance with AS 1012.14.
 - b. The dimensions and testing of the concrete cores must be in accordance with the requirements of AS 1012.14.
 - c. The conditioning of cores for assessment of compressive strength must be 'Dry-conditioning' in accordance with AS 1012.14. However, if directed by the Principal or if the concrete being assessed by cores is, or will be, more than superficially wet in service, 'Wet-conditioning' must be used.

- 6.2 To be deemed a conforming lot on the basis of compressive strength testing of cores, the:
- a. average adjusted compressive strength of the test cores (3 or more) must not be less than the specified minimum 28-day compressive strength; and
 - b. adjusted compressive strength of any core in each sample must not be less than 90% of the specified minimum 28-day compressive strength,
 - c. where the adjusted compressive strength is determined in accordance with AS 1012.14 and also includes adjustment in accordance with AS 5100.5 Appendix A6.4.2 and adjusted for age in accordance with TS 00146 Annexure D4.3.

7. Assessment of VPV

7.1 Clause 7.2 only applies if directed by the Principal or if specified in the Contract documents.

7.2 The following applies to coring undertaken for the assessment of VPV (where applicable):

- a. A minimum of two cores per sample must be tested.
- b. Each core must be 75 mm diameter x 150 mm long, cut transversely into two equal slices and tested for VPV at 28 days in accordance with test method AS 1012.21.
- c. The VPV value for each core must be determined from the average value of the test slices.
- d. For members where the thickness is less than 150 mm the core length must be the full thickness of the member. The specification will be satisfied if the VPV value for each sample, as determined from the average value of the test cores, does not exceed the specified maximum VPV value at 28 days as shown in TS 00146.
- e. Where the VPV value of any one sample representing the concrete exceeds the specified maximum 28-day VPV value, the Contractor must carry out rectification works. These works must achieve the specified level of durability, otherwise the concrete represented by that sample may be rejected.

8. Assessment of Concrete Wet Density

8.1 The following applies to coring for the assessment of the mass per unit volume ('Wet Density') of hardened concrete (if specified):

- a. A minimum of two cores per sample must be tested.
- b. Conditioning of cores must be 'wet conditioning' in accordance with AS 1012.14.

- c. Assessment of the Wet Density must be in accordance with AS 1012.12.2.
- d. The average Wet Density of two or more cores may be compared against the average saturated surface-dry density of standard cylinder tests that have been measured in accordance with either AS 1012.12.1 or AS 1012.12.2 and sampled from the same batches of concrete that the cores have been taken from.

8.2 The Wet Density value may be used to verify that the in-situ concrete compaction complies with the specified requirements and is suitable for its intended use.

Annexure A Summary of Hold Points, Witness Points and Records

The following is a summary of the Witness Points/Hold Points that apply to this Specification and the Records that the Contractor must submit to the Principal to demonstrate compliance with this Specification.

Clause	Hold point	Witness point	Records
4.1	Commencement of coring.		Quality Plan
5.6		1. Commencement of Coring	
5.13			Records of coring
6.2			Strength results (if applicable)
7.1			VPV results (if applicable)
8.1			Density results (if applicable)