Transport Roads & Maritime Services

NSW GOVERNMENT

Test method T310

Compressive strength of concrete cores

OCTOBER 2012

Revision Summary

Ed/Rev Number	Clause Number	Description of Revision	Authorisation	Date
		Reformatted and Revision Summary Added	D.Dash	May 1999
		Date on Test Method Revised to Agree with Date on Revision Summary	D.Dash	Feb 2001
Ed 2/ Rev 0	All	Reformatted RMS template	J Friedrich	October 2012

Note that Roads and Maritime Services is hereafter referred to as 'RMS'.

The most recent revision to Test method T310 (other than minor editorial changes) are indicated by a vertical line in the margin as shown here.

Test method T310

Compressive strength of concrete cores

1. Scope

This test method sets out the procedure for determining the compressive strength of concrete cores which have been taken from hardened concrete and which comply with the requirements of Australian Standard 1012, part 14. The procedure is derived from the methods described in AS 1012, Part 9 and Part 14.

2. Apparatus and Equipment

(a) A testing machine, for the determination of compressive strength of concrete test specimens conforming to the requirements of AS 1012, Part 9

(b) A diamond saw of a least 450 mm dia

(c) Engineer's square

(d) Feeler gauges and thickness meters

(e) Sulphur heating pot with thermostatic control

(f) An alignment device, to ensure that the specified perpendicularity of the sulphur cap to the axis of the cylinder is obtained. The device is to be fitted with a circular base plate which has a circular recess with 45^{o} sides, the thickness of the metal in the recessed area being at least 10 mm. The diameter of the recess is to be 5 mm larger than the nominal diameter of the test specimens.

(g) Sulphur, mixed with at least 10 percent of fly ash

3. Acceptance of Specimens

(a) Surfaces of the cores must be essentially smooth, plane, parallel and free from steps, ridges and grooves. Take care in handling cores to avoid chipping or cracking

(b) The surfaces of cores should be moistened if necessary and examined for cracks prior to conditioning. If any such cracks are found, saw that end of the core off so that the sawn off piece extends 12 mm beyond any visible crack

(c) Ends of cores shall be approximately smooth and perpendicular to the axis and of the same diameter as the body of the core. An end which has projections above the normal plane of more than 2 mm or an end which departs from perpendicularity to the axis by more than three degrees shall be sawn off so that the new end conforms to those tolerances

(d) When inspected in the uncapped state, the cores are to be rejected if the following defects are observed:

(i) If the diameter of the core is less than 75 mm

(ii) If any diameter departs by more than 2 mm from the mean diameter

(iii) If the length of the core when ready for capping is less than 1.5 times the diameter

(iv) If the core is scored more than 12 mm deep at any point

Note: If any specimen liable to rejection is required to be tested, all apparent imperfections shall be noted in the report.

4. Curing

(a) **Wet Curing** After preparation of the ends of the cores other than capping, completely submerge the cores in water at a temperature of $25 \pm 5^{\circ}$ C for 3 days prior to test.

(b) **Dry Curing** After preparation of the ends of the cores other than capping, store the cores in air at a temperature of $25 \pm 5^{\circ}$ C at a relative humidity of 50 ± 10 percent for seven days prior to test.

Unless otherwise specified or directed the cores are to be dry cured.

5. Capping of Specimens

5.1 Requirements

The uncapped end of a core which is to be placed in contact with that platen of the testing machine which is not spherically seated, or the surface of a cap similarly placed, must not depart from perpendicularity to the axis of the specimen by more than 0.5 degrees (approximately 3 mm in 300 mm).

Caps are to be as thin as practicable and only one layer of capping material is used. However, small depressions may be filled prior to capping. Capped surfaces must not depart from a plane by more than 0.05 mm.

5.2 Procedure

(a) Remove the core from its curing environment and note the presence and position of any reinforcement by measuring to the nearest 2 mm from the centre of the exposed bars to the top of the core as tested.

(b) Heat the sulphur/fly ash mixture in the pot to a suitable viscosity for capping.

(c) Remove all loose particles and laitance from the ends of the core with a wire brush, and ensure that the ends of the core are dry, by drying in front of a current of warm air if necessary.

(d) Pour enough molten sulphur mixture into the base of the capping device to form a complete layer across the bottom.

(e) Place and hold the core to be capped firmly against the guide plates of the device and allow it to slide slowly down into the sulphur.

(f) Hold the core in position until the sulphur has set, then remove the base from the cap with a sharp blow, while holding the core slightly above the bench level.

(g) Return the capped core to the curing conditions.

6. Compressive Strength Test Procedure

(a) Carry out all measuring and testing operations as promptly as possible after removal of the test specimen from the curing environment.

(b) Test all specimens in a dry condition unless wet testing is specified. Wipe away surplus water on specimens which have been cured by immersion before measuring and testing operations begin.

(c) Inspect each specimen before placing in the machine, testing each cap by tapping with a suitable instrument. Any hollow caps are to be removed and replaced before the specimen is tested.

(d) Measure and record the diameter and height of each specimen, the diameter being the mean of two diameters at right angles to each other near the centre of the length of the specimen, the measurements being made to the nearest 0.5 mm. The height is to be measured over the full dimension including the caps to the nearest 2 mm.

(e) Clean the platens of the testing machine with clean rag whenever necessary, making sure that the surfaces are free from films of oil or other lubricating materials and particles of grit.

(f) Clean the bearing surfaces of the specimens, making sure that they are free from oil and particles of grit.

(g) Place the specimen in the machine, aligning the axis of the specimen with the centre of thrust of the spherically-seated platen.

(h) Bring the upper platen into contact with the top of the specimen so that uniform bearing is obtained.

(i) Apply the load, without shock, increasing the load continuously at a rate equivalent to 20 ± 2 MPa compressive stress per minute until no increase in load can be sustained. Record the maximum load applied to the specimen.

(j) Examine the specimen after testing and record any defects not apparent prior to testing. Note any apparent effect of any reinforcement on the fracture of the core under test, and the presence of foreign inclusions, non-uniform moisture conditions and excessive air voids.

7. Calculations

(a) Calculate the compressive strength of the specimen by dividing the maximum load carried by the specimen by the calculated cross sectional area taken from the average diameter mid-height and report to the nearest 0.5 MPa.

(b) Report the maximum compressive stress in MPa.

8. Records

Record the following information concerning each test specimen.

(a) Identification of core

(b) Date of test

(c) Age of concrete in core at date of test, when known

(d) Dimensions of core

(e) Moisture condition of core when tested

(f) Size and position of any reinforcement

(g) Any defects in the core before testing

(h) Length/diameter ratio of core

(i) Load at failure

(j) Measured compressive strength, calculated to the nearest 0.5 MPa

(k) Type of fracture, if unusual

(l) Any defects in the caps or the core found after testing

9. Techniques

To assist in bonding the sulphur mixture cap to the end of the core, a thin layer of shellac solution may be applied to the end of the cylinder.