Transport Roads & Maritime Services

NSW GOVERNMENT

Test method T304

Moulding of concrete specimens for testing in compression, indirect tension and flexure

JUNE 2014

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 Roads and Maritime template	J Friedrich	October 2012
Ed 3/ Rev 0	All	Amendments made to methodology arising from experience on major projects and availability of apparatus.	G Vorobieff	June 2014

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

The most recent revision to Test method T304 (other than minor editorial changes) is indicated by a vertical line in the margin as shown here.

Test method T304

Moulding of concrete specimens for testing in compression, indirect tension and flexure

1. Compression and Indirect Tension

1.1 Scope

(a) This test method sets out the procedure for moulding standard concrete test cylinders of 100 mm or 150 mm diameter, for testing in compression or indirect tension.

(b) The method is similar to that in AS 1012.8 except that the compaction procedure is more specific and more detailed in order to improve test repeatability. The resulting unit mass will also typically be higher than that achieved using AS 1012.8.

1.2 Requirements

(a) All test specimens of a set must be moulded from the same sample of concrete.

(b) Method 8.1 of AS 1012.8 must be used except that:

(i) Internal vibrators must be used, of the type described below, except for steel fibre reinforced concrete (SFRC), which must must be compacted by either internal or external vibration

(ii) In all cases, the detailed procedure of compaction described below must be used.

(c) Internal vibrators must be powered by 240 Volt 50 Hz electricity and have:

(i) A frequency of vibration between 115 Hz and 270 Hz

(ii) A minimum outside diameter of 15 mm

(iii) A maximum outside diameter of 25% of the test cylinder diameter

(iv) Vibrators at project sites must have a single fixed frequency of vibration which cannot be altered.

(d) External vibrators must be powered by 240 Volt 50 Hz electricity and must operate at a frequency of 50 ± 1 Hz and at a resultant amplitude a_r of 1.0 ± 0.1 mm under working load, calculated as follows:

$$a_r = \sqrt{\left(a_x^2 + a_y^2 + a_z^2\right)}$$

Where a_x, a_y and a_z are amplitudes measured in each vector axis.

1.3 Procedure

1.3.1 Compaction by Internal Vibrator

(a) Fill the mould with concrete in two approximately equal layers.

(b) Compact each layer by inserting the vibrator in at least two locations, approximately at the quarter points of one diameter.

(c) For each insertion, compact the concrete for a period of at least three (3) seconds, and then slowly extract the vibrator over a further period of three (3) seconds or more.

Note: Do not rest the vibrator on the bottom of the mould or touch the sides of the mould with it.

(d) If, after the completion of stage (c), substantial air bubbles continue to surface either:

(i) Vibrate the concrete until the surface becomes relatively smooth in appearance and substantial air bubbles cease breaking the surface (note: do not unduly prolong the vibration beyond this point), or

(ii) Lightly tap the sides of the mould with a rubber mallet to close any voids

(e) For the top layer, insert the vibrator on the diameter at right angles to that used previously and to a depth just into the first layer.

(f) Try to place sufficient concrete in the top layer to overfill the mould when compacted. If after partial compaction of the top layer the mould is not completely filled, add additional concrete at that point, and then complete the compaction.

(g) Smooth the surface of the concrete with a timber float finish whilst striking off any excess material. Avoid a mirror finish.

1.3.2 Compaction by Table Vibrator (SFRC only)

(a) Fill the mould with concrete in two approximately equal layers.

(b) Compact each layer on the vibrating table for at least 30 seconds.

(c) If, after the completion of stage (b), substantial air bubbles continue to surface, either:

(i) Vibrate each layer until the surface becomes relatively smooth in appearance and substantial air bubbles cease breaking the surface (note: do not unduly prolong the vibration beyond this point), or

(ii) Lightly tap the sides of the mould with a rubber mallet to close any voids.

(d) Prior to filling the second layer, scarify the surface of the first layer to promote bonding. When filling the second layer, try to place sufficient concrete in the mould to overfill it when compacted. If after partial compaction the mould is not completely filled, add additional concrete while the compaction continues.

(e) Smooth the surface of the concrete with a timber float finish whilst striking off any excess material. Avoid a mirror finish.

2. Flexure

2.1 Scope

(a) This test method sets out the procedure to be followed in moulding standard concrete beam specimens for testing in flexure.

(b) The procedure is similar to that in AS 1012.8 except that compaction is more specific and more detailed in order to improve test repeatability. The resulting unit mass will also typically be higher than that achieved using AS 1012.8.

(c) For SFRC, the specified specimen size may be different from those listed in AS 1012.8, and a tee-bar must be used in lieu of a rod.

2.2 Requirements

(a) All test specimens of a set must be moulded from the same sample of concrete.

(b) Method 8.2 of AS 1012.8 must be used except that:

(i) Either internal or table vibrators must be used, as described below, except for steel fibre reinforced concrete (SFRC)

(ii) For SFRC, compaction must be as follows:

- For slipform mixes: by external vibration
- For fixed form (hand) mixes: by external vibration or by tamping tee-bar
- The detailed procedure for compaction described below must be used.

(c) Internal vibrators must be powered by 240 Volt 50 Hz electricity and have:

- Frequency of vibration between 115 Hz and 270 Hz
- A minimum outside diameter of 15 mm
- A maximum outside diameter of 25% of the least dimension of the mould
- Vibrators at project sites must have a single fixed frequency of vibration which cannot be altered.

(d) Table vibrators must comply with clause 1.2 (d)

2.3 Procedure

2.3.1 Compaction by Internal Vibrator

(a) Try to place sufficient concrete in the mould to overfill it when compacted. If after partial compaction the mould is not completely filled, add additional concrete at that point, and then complete the compaction.

(b) Compact the concrete by inserting the vibrator in at least four locations spaced uniformly along the length of the specimen, starting with the central locations and alternating from one half of the specimen to the other, in the following sequence:

3	1	2	4

(c) After inserting the vibrator, compact the concrete for a period of at least three (3) seconds, and then slowly extract the vibrator over a further period of three (3) seconds or more.

Note: Do not rest the vibrator on the bottom of the mould or touch the sides of the mould with it.

(d) If, after the completion of stage (c) substantial air bubbles continue to surface, either:

(i) Vibrate the concrete until the surface becomes relatively smooth in appearance and substantial air bubbles cease breaking the surface

Note: Do not unduly prolong the vibration beyond this point.

or

(ii) Lightly tap the sides of the mould with a rubber mallet to close any voids.

(e) Strike off and smooth the surface of the concrete. Avoid a mirror finish.

2.3.2 Compaction by Table Vibrator

(a) Try to place sufficient concrete in the mould to overfill it when compacted. If after partial compaction the mould is not completely filled, add additional concrete while the compaction continues.

(b) Compact the concrete on the vibrating table for at least 30 seconds.

(c) If, after the completion of stage (b), substantial air bubbles continue to surface, either:

(i) Vibrate the concrete until the surface becomes relatively smooth in appearance and substantial air bubbles cease breaking the surface

Note: Do not unduly prolong the vibration beyond this point

or

(ii) Lightly tap the sides of the mould with a rubber mallet to close any voids.

(d) Smooth the surface of the concrete with a timber float finish whilst striking off any excess material. Avoid a mirror finish.

2.3.3 Compaction by Tamping Tee-bar (SFRC only)

The procedure in Test Method 8.2 of AS 1012.8 must be used except that:

(a) A tee-bar must be used in lieu of a rod. The tee-bar must be made from round steel bar 16 ± 1 mm in diameter, with a stem 500 ± 100 mm long and a cross tee section of length 90 ± 5 mm.

(b) The concrete must not be spaded. Clause 7.3(c) of AS 1012.8 must be deleted.

(c) Overfilling of the mould must be avoided or minimised; Clause 7.3(e) refers.

The procedure for the compaction of specimens by tamping must be as follows:

(d) Fill the mould in two approximately equal layers.

(e) Compact each layer by tamping and distribute the strokes uniformly over the area of the beam. The number of strokes per layer must be one for each 650 mm^2 of surface. This is equivalent to

115 strokes for a 150 mm wide beam and 55 strokes for a 100 mm wide beam. The cross tee section should not penetrate the concrete by more than half its diameter.

(f) If the mould is not completely filled after partial compaction of the top layer, add some additional concrete and complete the compaction.

(g) Lightly tap the sides of the mould with a rubber mallet to close any voids.

(h) After the top layer has been compacted, smooth the surface of the concrete with a timber float finish whilst striking off any excess material. Avoid a mirror finish.