



Transport
Roads & Maritime
Services

Test method T334

Tensile bond strength of epoxy resin mortar

OCTOBER 2012



Revision Summary

Ed/Rev Number	Clause Number	Description of Revision	Authorisation	Date
Ed 1/ Rev 1		Reformatted and Revision Summary Added	D.Dash	May 1999
Ed 1/ Rev 2		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 T334 (other than minor editorial changes) are indicated by a vertical line in the margin as shown here.

Test method T334

Tensile bond strength of epoxy resin mortar

1. Scope

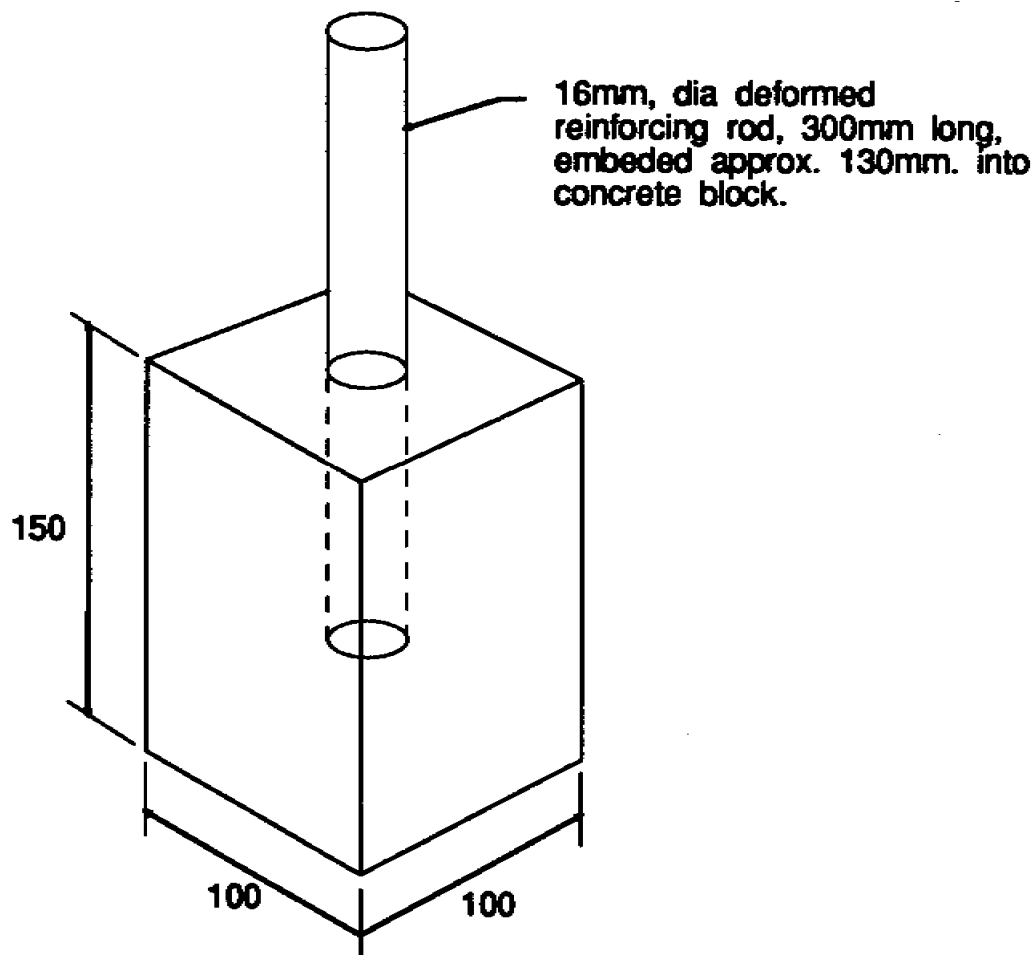
This test method sets out the procedure for determining the tensile bond strength developed by epoxy mortars used for joining and patching Portland cement concrete.

2. Apparatus

Tensile testing machine with a capacity of 100 kN, with a loading rate between 50 and 100 kN per minute, capable of gripping the steel rods of the test specimens in correct alignment.
Timber or metal moulds for assembling test specimens.

3. Preparation of Test Specimens

- (a) Prepare test blocks as shown in the diagram below, from 40 MPa Portland cement concrete having aggregate of maximum nominal size of 10 mm.



Concrete Test Block

- (b) Cure the blocks in the moulds in a moist atmosphere for a period of 24 hours.
(c) Remove the blocks from the moulds and cure in a curing chamber at 95% humidity and a temperature of $23 \pm 2^\circ\text{C}$ for 14 days.
(d) Etch the surfaces to be joined with epoxy mortar with a solution of hydrochloric acid (consisting of one part of Commercial Hydrochloric Acid diluted with two parts of water). Remove all laitance and rinse the blocks thoroughly, first with tap water and finally with saturated lime water.

- (e) If the test is to be made on wet blocks, the jointing should immediately follow the acid etching and washing. If the test is to be made on dry blocks, the blocks are dried for between three and five days at $23 \pm 2^\circ\text{C}$ and relative humidity of $50\% \pm 5\%$.
- (f) Coat the faces of the test blocks to be joined with a coating of the epoxy resin under test, mixed in accordance with the manufacturer's instruction.
- (g) Assemble the test blocks in moulds, the moulds being lightly coated with release agent such as petroleum jelly in the section where contact will be made with the epoxy mortar, ensuring that the release agent does not contaminate the test faces of the concrete blocks. Leave a gap of 12 to 15 mm between the faces to be joined.
- (h) Tamp epoxy mortar prepared in accordance with Test Method T330 into the gap between the test blocks in three layers, using 30 tamps per layer ensuring uniform compaction. Slightly overfill the gap with the third layer and after tamping, remove the excess by screeding.
- (i) Leave the test assembly undisturbed for 24 hours at a temperature at $23 \pm 2^\circ\text{C}$. Remove the mould and cure the test specimen for a further 6 days at ambient conditions unless otherwise specified, before testing.

4. Procedure

- (a) Assemble the test specimen in the tensile testing machine, ensuring that the steel rods are correctly aligned.
- (b) Apply the test load without shock at a loading rate of 50 to 100 kN per minute until failure occurs.
- (c) Record the load and location of failure.

5. Calculation and Report

Calculate the ultimate tensile strength from the following formula

$$\text{Tensile Strength (MPa)} = \frac{\text{Ultimate Load (kN)} \times 10^3}{\text{cross sectional area (mm}^2\text{)}}$$

Report the tensile strength to the nearest 0.5 MPa and also the position and mode of failure.

6. Safety Procedures

- (a) In common with many materials used in industry epoxy resins and their hardeners may cause dermatitis reactions in sensitive persons, particularly when there is repeated contact. The following practices should therefore be followed.
- (b) Use a skin forming barrier cream on clean hands before commencing each working session and wash it off at the end of each session.
- (c) Use rubber or plastic coated gloves when there is a likelihood of touching the products. Disposable plastic gloves are generally suitable for laboratory work. Remove the gloves by pulling at the fingers and put gloves on clean hands only.
- (d) Use goggles if there is a likelihood of splashing occurring.
- (e) Do not use solvents to clean material spilt on the skin but use warm soapy water.
- (f) Do not leave rags or paper which have been used to wipe up these products where they will be subsequently handled by persons without protective clothing. Use small pieces of rag for cleaning and discard each piece as it is used.

7. Cleaning of Equipment

Use a mixture of toluol and acetone (80:20 by volume) to clean resin from tools, equipment etc., before it cures. No common solvent will remove cured resin.