



Test method T339

Tensile bond strength development of epoxy adhesives for raised pavement markers

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 1/ 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 T339 (other than minor editorial changes) are indicated by a vertical line in the margin as shown here.

Test method T339

Tensile bond strength development of epoxy adhesives for raised pavement markers

1. Scope

This Method sets out the procedure for determining the time necessary for the cured adhesive to develop a minimum bond strength in tensile shear, in accordance with the Australian Standard for Adhesives for Raised Pavement Markers (in preparation).

2. Principle

A lap joint test assembly in tension producing a shear force on the adhesive. The value of the failing load of the lap joint is an indication of the shear strength of the adhesive. The time taken to achieve minimum bond strength in the specimen is estimated from a series of tensile shear tests on bonds formed at four curing temperatures.

3. Apparatus and Material

- (a) Tensile testing machine, complying with the Grade B requirements of AS B128 with a rate of grip separation of 50 mm/min and a capacity of at least 1200N.
- (b) Flat assembly plates, 75 ± 0.25 mm x 25 ± 0.25 mm x 3 ± 0.025 mm, aluminium type A 5005 temper as supplied in accordance with AS 1734.

The aluminium plates shall be prepared by scrubbing the aluminium surfaces thoroughly with a non-chlorinated solvent and then etched with a suitable chromate treatment, observing safety precautions. After etching, the surfaces are washed with distilled water and dried thoroughly.

Note: A suitable etching composition is a mixture of Sodium Dichromate

($\text{Na}_2\text{Cr}_2\text{O}_7, 2\text{H}_2\text{O}$) at a concentration of 45 - 82 g/L and Sulphuric Acid (density 1840 kg/m³) at a concentration of $3\frac{1}{3}$ times the concentration of the Sodium Dichromate ($\text{Na}_2\text{Cr}_2\text{O}_7, 2\text{H}_2\text{O}$), made up in demineralised water and used at 60-65°C for 20 - 30 minutes.

Alternatively steel panels of the above dimensions with surface preparation to class 2 $\frac{1}{2}$ AS 1627 Part 4 may be used. Flat base plate of dimensions approximately 250 x 100 mm. Doctor blade (as shown in Fig A1 of AS 2131).

4. Conditioning

All materials used in testing shall be conditioned at a temperature of $23 \pm 2^\circ\text{C}$ and relative humidity of 50 ± 5 percent for at least 24 hours before use.

The adhesive containers shall be kept closed when not in use.

Preparation of Test Assemblies

Test assemblies shall be prepared as follows:

- (a) Mix the adhesive to be tested and, using the flat base plate and doctor blade, apply a layer 0.25 ± 0.025 mm thick over a distance of slightly more than 25 mm from one end of a pre-treated assembly plate.
- (b) Position the test assembly centrally so that the bonded area is 625 mm² and the long edges of the plates are parallel. (See Fig 1).
- (c) Allow the load assemblies to cure for the times and temperatures specified for slow and rapid set adhesive types.

5. Procedure

The test procedure shall be as follows:

- (a) Determine the bond strength in shear of each of the test assemblies in the tensile testing machine, with a 100 mm grip spacing and a speed of separation of the grips of 50 mm/min.

- (b) Record for each test assembly the load at failure together with the time the test assembly was exposed to the curing temperature.
- (c) A sufficient number of bond strength measurements should be made at the specified temperature to permit interpolation of time for development of the minimum bond strength.

6. Calculations

- (a) Plot the mean bond strength in tensile shear against the time intervals the test assemblies were exposed to the test temperature.
- (b) Interpolate the time to achieve the specified minimum bond strength.

7. Reporting

The report shall include the following:

- (a) The identification of the adhesive, manufacturer and type
- (b) Bonding conditions. Type of panel used.
- (c) Curing temperature of the test assembly
- (d) The time to reach specified minimum bond strength in minutes.

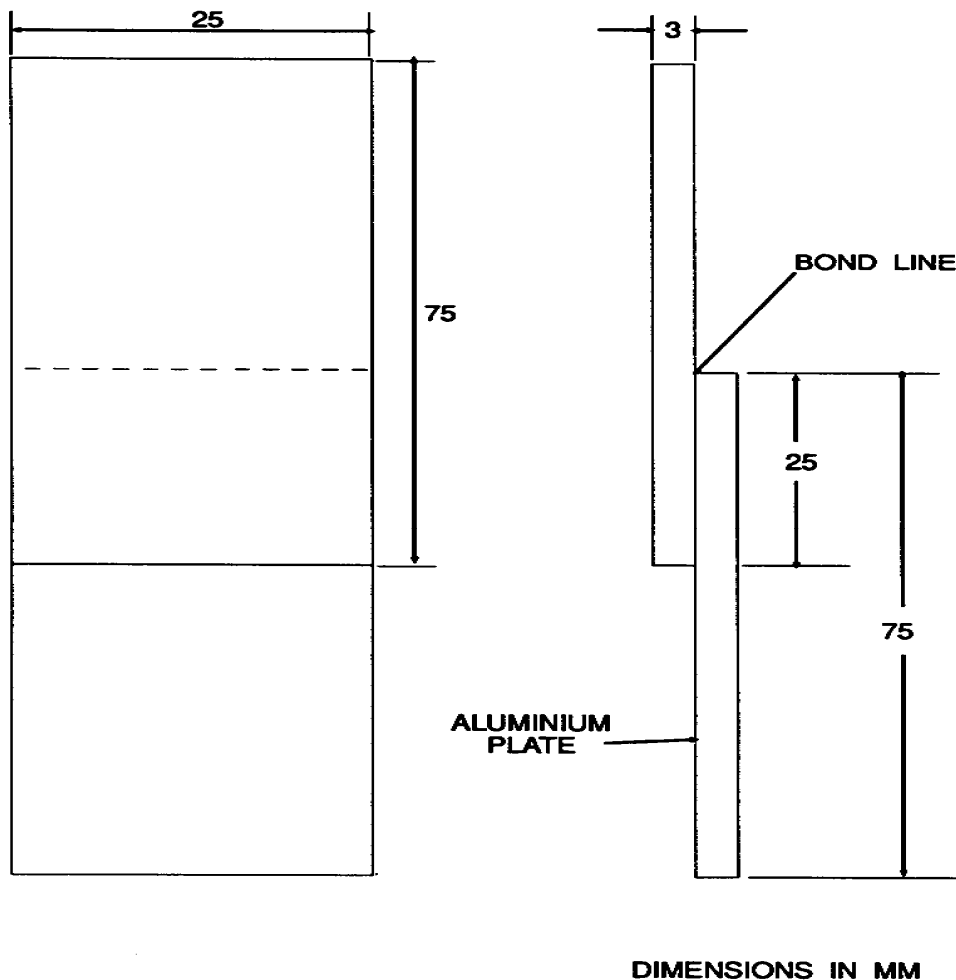


Fig. 1 TEST ASSEMBLIES