



Test method T1172

Tensile bond strength test for hot poured joint sealant

NOVEMBER 2012



Revision Summary

Ed/Rev Number	Clause Number	Description of Revision	Authorisation	Date
		Reformatted and Generally Revised	D.Dash	July 1999
Ed 2/ Rev 0	All	Reformatted RMS template	J Friedrich	November 2012

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

The most recent revision to Test method T1172 (other than minor editorial changes) are indicated by a vertical line in the margin as shown here.

Test method T1172

Tensile bond strength test for hot poured joint sealant

1. Scope

This test method describes the procedure to assess whether a joint sealant will remain cohesive and will continue to adhere to a concrete surface (primed as recommended by the manufacturer) when subject to extension cycling at $2 \pm 2^\circ\text{C}$. This test method is adapted from that described in American Society for Testing Materials Designation, D3408 - 75T and D 3583.

2. Safety Notes

Handling precautions relevant for bitumen also apply to hot poured joint sealant. A poster describing the action to be taken in the event of bitumen burns must be displayed in the laboratory in the vicinity of the bitumen pouring area(s). Use either tongs or heat resisting gloves when handling hot bitumen. Loose or puncture lids before heating containers. Examine cold samples for signs of water. Remove all visible water. Wear spectacles when heating samples suspected of containing water. Cleaning solvents such as toluene may be toxic, handle such solvents in a fume cupboard, consult Safety Data Sheet.

3. Apparatus

- (a) Cement mortar blocks prepared as described below, having one flat face measuring 50.00 ± 0.15 mm square, and approximately 25 mm thick.
- (b) Jig as detailed in Figure 2. The design of the jig shall be such that the sealant may be poured into the space between the blocks.
- (c) A ceramic tile or glass base plate with dimensions approximately 150 mm by 200 mm.
- (d) A 50 mm diameter metal ring approximately 15 mm high.
- (e) Sample holders as detailed in Figure 3.
- (f) Two spacers each 25 mm \times 12 mm \times 50 mm.
- (g) A thermostatically controlled oven with good air circulation, capable of maintaining the temperature within the range of 105°C to 110°C .
- (h) Temperature controlled heating block, 105°C to 210°C , as described in T1170 - Preparation of Hot Poured Joint Sealing Compound for Test.
- (i) A desiccator.
- (j) A stiff metal spatula approximately 150 mm long and 25 mm wide.
- (k) Carborundum powder - 80 grade.
- (l) Force ductilometer conforming to MBT23.
- (m) Strong flexible kink-free wire, eg galvanised steel wire approx 0.5 mm diameter.
- (n) Ruler graduated in mm.
- (o) Stopwatch.
- (p) Thick rubber gloves.
- (q) Release agent.

4. Preparation of Mortar Blocks

- (a) Make a mixture of one part Portland cement to 1.5 parts by mass of sand. Add just sufficient water to obtain a mix suitable for tamping. Avoid the use of too much water which could cause segregation during compaction.
- (b) Thoroughly compact the mortar in suitable moulds in two or more layers with a suitable hand tapper and cure in the moulds for 24 hours in moist air (e.g. fog room).
- (c) Remove from the moulds and cure a further six days in lime-saturated water.
- (d) After curing, grind down the off-form 50 mm square face of each block with 80 grade carborundum powder and water on a level glass surface to give a smooth fresh surface. Fresh carborundum shall be used for each block.
- (e) Reject any blocks that have been damaged during curing or grinding or which are found to contain cavities more than 1.5 mm diameter in the ground face.
- (f) After grinding and air drying, wash with toluene followed by methylated spirits and finally water.
- (g) Dry in an oven at a temperature of 105-110°C for at least 12 hours and store in a desiccator until required.

5. Preparation of Test Results

- (a) Treat the base plate, ring and those surfaces of the jig that are to come into contact with the joint sealant with a suitable release agent.
- (b) Place the mortar blocks in the jig, centrally located on the base plate, at a temperature of 16-26°C, being careful not to handle the prepared faces, which should be facing towards the centre. If required, treat these faces with primer prior to assembly (see note below).
- (c) Heat the sample of joint sealant, in accordance with Test Method T1170, and pour sufficient sealant into the space between the mortar blocks to provide an excess of 15 mm above the timber frame using the ring as a reservoir to provide the excess of sealant.
- (d) Cool for one hour, remove the ring, and then cut off the excess sealant with a heated spatula so that the remaining sealant has dimensions 50 mm × 25 mm × 25 mm.
- (e) Remove the specimen from the jig.
- (f) Allow the specimen to age for seven days at a temperature of 16-26°C and at a relative humidity of 45-75% before testing.

Note: If the manufacturer recommends the use of a primer, this must be brushed well into the prepared faces of the blocks and slightly over the edges. Care must be taken to avoid leaving a thick film of primer on the blocks. Store the blocks for 2 hours in a dust-free atmosphere to allow the primer to dry before the blocks are placed in the assembly jig.

6. Procedure

- (a) Condition the prepared specimen 16 - 24 hours at $2 \pm 2^\circ\text{C}$.
- (b) Bring the ductility bath to $2 \pm 2^\circ\text{C}$ and maintain throughout the testing.
- (c) Turn the ductilometer gear box to slowest speed at which it will reliably function. It is assumed this is 10 mm per minute (see note). Calibrate this speed by measuring it 3 times using a stop watch.
- (d) With steel wire tie the two sample holders to the pegs of the ductilometer. A clamp may be used provided the sample is not stressed during placement.
- (e) Slip the sample into the sample holders. Turn on the travel of the ductilometer and hold the sample (using gloves to keep hands warm) until slack in the system is taken up, and no kinks are seen in the wire. The force on the load cell should have just moved off zero (4N). Immediately turn off the ductilometer travel motor. (The force should decay to zero in a few minutes).
- (f) After 30 minutes at the “zero point” (1N load) measure the distance between the concrete blocks at four positions. Take the mean.

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- (g) Turn the ductilometer screw on for exactly 15 seconds; continue timing.
 - (h) Verify that the distance between the blocks has increased by 2.5 mm.
 - (i) After 5 minutes total elapsed time repeat step (g), continue in this way until a total of 5×15 second extensions have been applied over 20 minutes.
 - (j) Verify that the concrete blocks are now 12.5 - 13.5 mm (50 - 54% total extension) further apart than at step (f).
 - (k) At 2 minutes 45 seconds after the last extension (23 minutes total elapsed time) record the force (N). Examine the exposed faces and estimate the area detached from the concrete and any cracks within the sealant.
 - (l) After extension as described in (g), (h) and (i) remove the specimen from the ductilometer and stand it vertically on one mortar block as base. Place the two spacers between the mortar blocks on opposite sides of the sealant, so that when the sealant regains its original shape, the top mortar block will rest on the spacers. Allow the specimen to stand for 1 hour at room temperature.
 - (m) Replicate steps (e) to (l) three times in all.
 - (n) Record final block separation 1 hour after the last extension.

Note: If the ductilometer speed chosen is different from 10 mm/minute the extension time should be scaled accordingly, eg if 3 mm/minute was set, then the on time should be $10/3 \times 15 = 50$ seconds.

7. Report

- (a) Adhesion -Report the total surface area of both blocks from which the sealant has separated in mm^2 .

Cohesion -Report the surface area of ruptures on the surface in mm^2 . Report the depth of any cavity or ruptures in the surface in mm measured normally to the surface of the specimen.

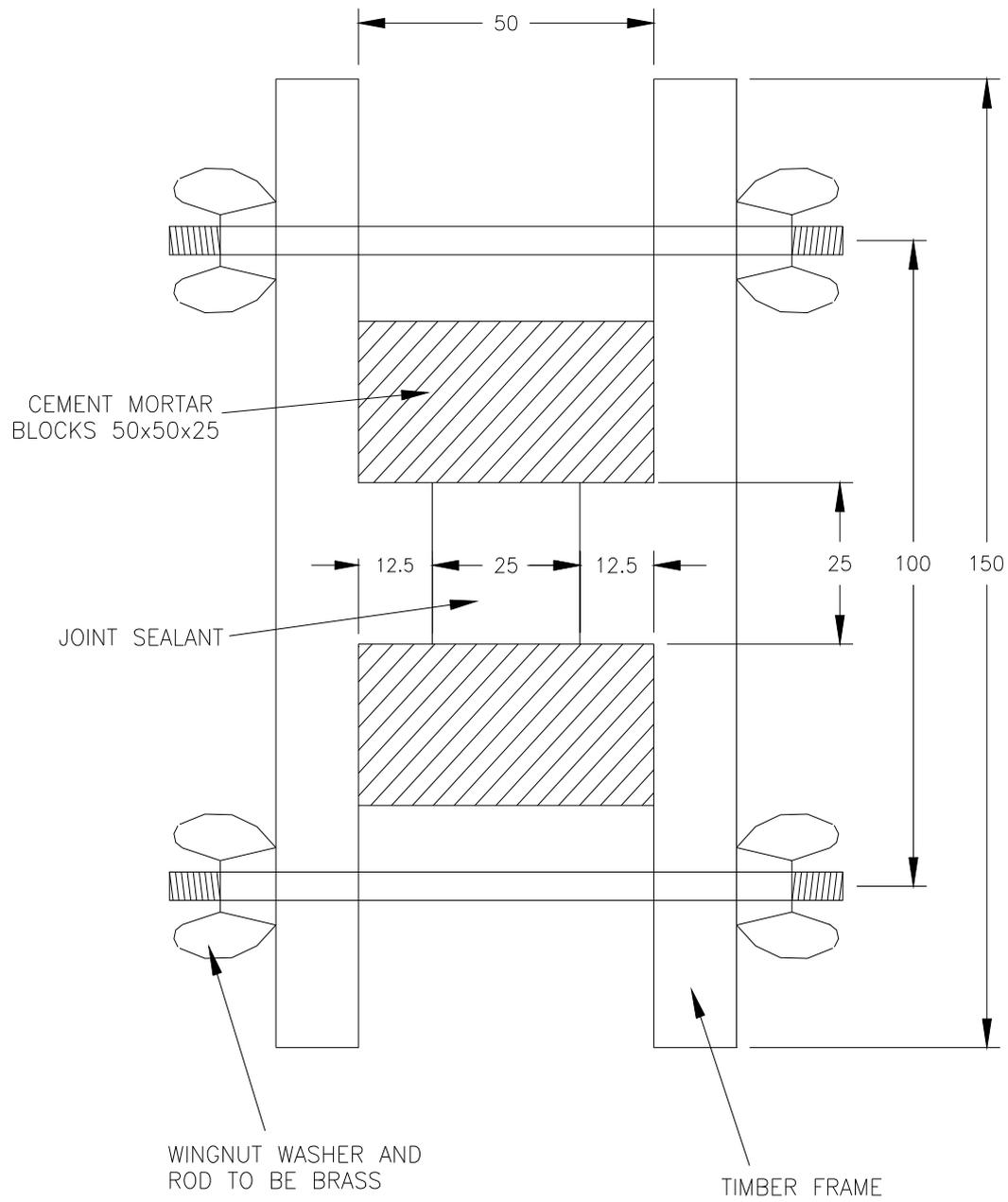


Figure 1: Plan of Assembly Jig (50 mm)
(All dimensions in millimetres)

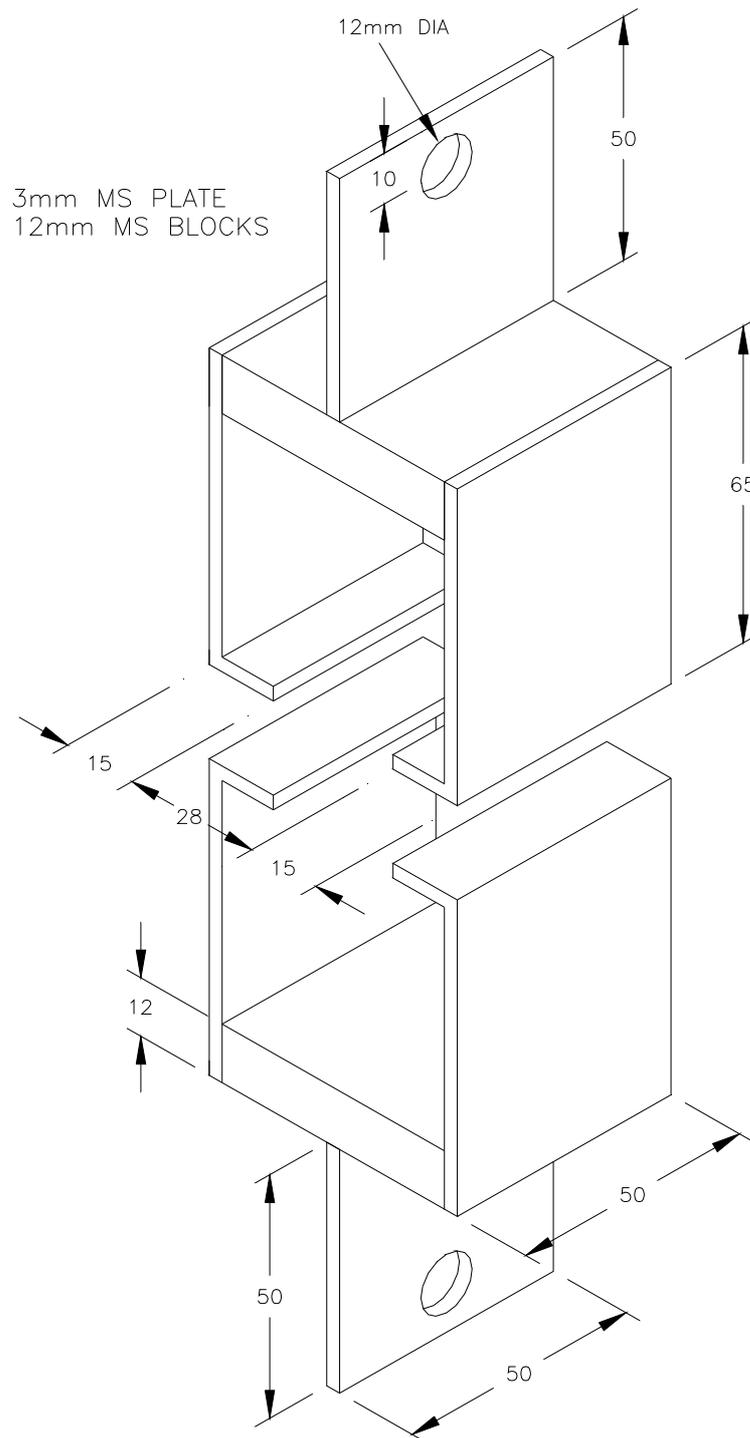


Figure 2: Diagram of Holding Jig
(All dimensions in millimetres)