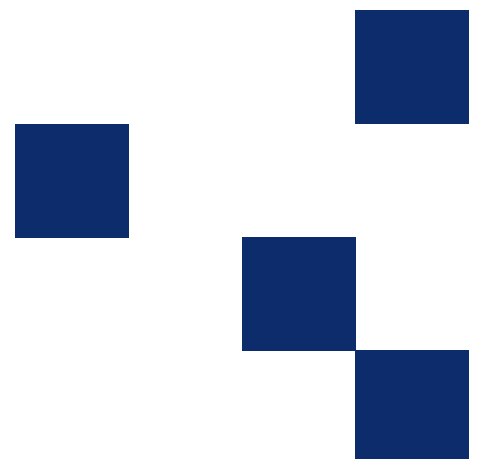




Test method T601

Compaction of test specimens of dense graded bituminous mixtures – Modified Hubbard – Field procedure

NOVEMBER 2012



Revision Summary

Ed/Rev Number	Clause Number	Description of Revision	Authorisation	Date
		Reformatted and Revision Summary Added. Safety Notes Added 2(c)and 3(m) Altered. 6(c)Added	D.Dash	Jan 2000
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 T601 (other than minor editorial changes) are indicated by a vertical line in the margin as shown here.

Test method T601

Compaction of test specimens of dense graded bituminous mixtures – Modified Hubbard – Field procedure

1. Scope

This test method sets out the procedure for preparing 152 mm diameter test specimens of dense graded bituminous mixtures. It is suitable for mixtures of nominal sizes up to 40 mm.

2. Safety Notes

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. Loosen 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 and consult safety data sheet.

3. Apparatus

- (a) A thermostatically controlled oven, at least 0.25m³ in volume, capable of maintaining temperatures up to 150°C within a range of 10°C.
- (b) Mixing apparatus such as a steel tray, trowel, spatula and scoop.
- (c) Quartering apparatus such as metal plates of dimensions 400 mm x 125 mm and 200 mm x 125 mm or sample dividers (riffle boxes) of appropriate size opening, e.g. the multiple slot type similar to those shown in Australian Standard AS 1289.1.2.
- (d) Metal mixing dishes, approximately 350 mm diameter at the top, depth 60 mm and with sloping sides and smooth surface finish.
- (e) Steel moulds, having an internal diameter and depth of 152 mm machined on the inside to a smooth surface.
- (f) A machined steel base plate 300 mm x 200 mm x 25 mm thick.
- (g) A compaction stand or bench of heavy wooden construction secured to a solid concrete floor or slab.
- (h) A tamper of 47.5 mm diameter, and a tamper-plunger of 146 mm diameter.
- (i) Heating devices such as hotplates, one type with a circular heating face to accommodate a mixing dish and a second larger type suitable for heating the base plate and compaction tools.
- (j) A compression machine, capable of applying a load of 44.5 kN to the compacted specimen.
- (k) A balance of not less than 5 kg capacity, accurate and readable to 1 g.
- (l) A thermometer in a metal case, range 0°C to 200°C in divisions of 2°C.
- (m) Heat resisting gloves and tongs for handling hot apparatus.
- (n) Marking crayon.

4. Preparation of Samples

Heat the sample in its original container in the air oven at $140^{\circ}\text{C} \pm 3^{\circ}\text{C}$ for a bitumen mix or 105°C to 110°C for a tar mix, until the material can be broken up and well mixed. Avoid unnecessary length of heating and exposure to air. Transfer the sample to the mixing tray, mix well, reduce the size of the sample by quartering or riffing to obtain 3000 ± 25 g and place in mixing dish.

5. Procedure

- (a) Heat the mould in the air oven at $140^{\circ}\text{C} \pm 3^{\circ}\text{C}$ for a bitumen mix or 105°C to 110°C for a tar mix and the base plate and compaction tampers on the hotplate.
- (b) Heat the test sample in the air oven at $140^{\circ}\text{C} \pm 3^{\circ}\text{C}$ for a bitumen mix or 105°C to 110°C for a tar mix, for a period not exceeding 1.5 hours.
- (c) Remove the test sample from the oven and check the temperature by inserting the thermometer and stirring the material with the trowel until the temperature is reasonably steady.
- (d) If necessary, adjust the temperature to within the range $140^{\circ}\text{C} \pm 3^{\circ}\text{C}$ for a bitumen mix or 105°C to 110°C for a tar mix by heating on the hotplate while stirring continuously with the trowel to ensure even distribution of heat and determining the temperature as before.
- (e) Place the preheated mould in the base plate, lightly oil and without delay, introduce about one half of the material into the mould taking care to distribute evenly the coarse and fine materials.
- (f) Tamp the material in mould with 40 short firm blows of the 47.5 mm diameter tamper, evenly distributed over the surface.
- (g) Scarify the surface of the compacted mixture with a putty knife, place the remainder of the material in the mould and compact in the same manner. Now apply additional compaction, using 40 strong blows of the 146 mm tamper to level the top surface of the specimen.
- (h) Carefully invert the mould and slide the specimen to the bottom of the mould, with the aid of the plunger if necessary. Compact the new top surface of the specimen with 40 blows of the 47.5 mm tamper. Once again apply additional compaction using 40 strong blows of the 146 mm tamper to level the top surface of the specimen.
- (i) Place the plunger in position and transfer the mould and base plate assembly to the compression machine. Apply a force of 44.5 kN to the specimen, sustained for 2 minutes. Release the force and allow the mould and specimen to cool on the bench.
- (j) Remove the specimen from the mould, mark with an identifying number and store for subsequent testing.

6. Techniques

- (a) The temperature of the mixture at compaction may be varied to suit the grade of binder use. The temperature prescribed in Procedures (b) and (d) is that normally suitable for a Class 170 bitumen or T200 and T500 tar. If there is any doubt as to the desirable temperature, prepare trial specimens at which the viscosity of the binder lies between 1 and 5 Poises. Select the lowest temperature at which the bulk density ceases to be markedly influenced by temperature.
- (b) When rapid cooling is required, table fans may be used, but the specimen must not be placed in water unless it is in a plastic bag.
- (c) Safety data sheet must be consulted before commencing testing or handling materials