



Transport
Roads & Maritime
Services

Test method T739

Torsional recovery of polymer modified bitumen

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Revision Summary

| Ed/Rev Number | Clause Number | Description of Revision | Authorisation | Date |
|---------------|---------------|--|---------------|---------------|
| | | Reformatted and Revision Summary Added. Safety Notes Added | D.Dash | Jan 2000 |
| Ed 2/ Rev 0 | All | Reformatted RMS template | J. Friedrich | November 2012 |
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Note that Roads and Maritime Services is hereafter referred to as 'RMS'.

The most recent revision to Test method T739 (other than minor editorial changes) are indicated by a vertical line in the margin as shown here.

Test method T739

Torsional recovery of polymer modified bitumen

1. Scope

This test measures the percentage recovery which an approximately annular sample of rubber or polymer modified bitumen will exhibit in thirty seconds after torsional distortion through 180°.

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, consult safety data sheet.

3. Apparatus

- (a) Cylindrical headed aluminium bolt assembly as illustrated in Figure 1. The bolt has a cylindrical head 28.6 mm dia 9.52 ± 0.02 mm thick. The shank and threaded portion has a length of 44.5 mm. This is drilled through the central axis to give a total weight of 42.9g ± 0.5 g (for the bolt, nut(s) and spider). The spider is a nut with 3 radial spokes with notches for centering and supporting the bolt. One or more hexagonal nuts are needed to lock the spider into position and to enable the torsional force to be applied to the nut with no relative motion of the spider. The spider has a demountable pointer.
- (b) A sample tin such as is used in method T506 (Penetration) of capacity 80-85 mL and internal diameter 51-52 mm.
- (c) A goniometer - sample clamp assembly consisting of a solid block with at least a half circle of greater than 80 mm radius graduated in degrees and a sample tin clamp capable of centering the tin to ± 3 mm and holding it in position without deforming the sample tin by more than 3 mm in any dimension. (Many arrangements would be suitable, e.g. Jubilee Clip, vee blocks, lathe type chuck, oil filter type strap).
- (d) Water bath maintained at 25°C ± 0.5°C and thermometer such as IP 39 C.
- (e) Oven maintained at 160 - 180°C.
- (f) Clock or stopwatch.
- (g) Spanner (or torsion wrench).

4. Preparation of Sample

This must be according to method T735.

5. Procedure

(To be performed in triplicate unless directed otherwise).

- (a) Select a tin, bolt, nut and spider and screw the bolt into the spider so that the upper surface of the bolt head is 8 ± 2 mm below the top of the sample tin when in position.
- (b) Warm the assembly in the oven 2(e) for at least 10 minutes.
- (c) Quickly remove assembly from oven to non-conductive surface and quickly pour the hot (180°C) modified bitumen until it begins to form a meniscus on the top edge of the bolt.
- (d) Allow to cool for 1 hour. Place the assembly in the 25°C water bath for 1 hour then raise the spider by screwing to position it above the rim of the tin by 7 mm ± 2 mm. Replace in the 25°C water bath for a few minutes to dissipate any heat due to handling.

- (e) Place sample tin on goniometer block and fit pointer. Adjust pointer to 180° position and clamp. (Do not stress the bitumen during this operation.)
- (f) With the spanner, steadily turn the nut so that the pointer moves from 180° to 0° in 10 seconds ensuring spokes do not touch rim of tin. (For a few exceptional samples, 10 seconds may not be possible and this should be noted on the report).
- (g) Immediately as the pointer reaches the 0° mark, release it and start the timer.
- (h) At 30 seconds note the recovery angle. This is normally the end of the test but if recovery at 30 minutes is specifically requested, continue.
- (i) Take steps to see that pointer weight does not cause nut, spider assembly to fall over either by temporarily removing pointer if it can be replaced with precision or by using a low friction support in the (hollow) axis of the nut. If the goniometer assembly is not in a 25°C air conditioned room the whole assembly may be immersed in the water bath.
- (j) Note the recovery angle at 30 minutes (see note).

6. Calculations

Calculate the % recovery of the 180° deformation:

$$\text{Percentage Recovery} = \frac{\text{Angle returned in degrees}}{180} \times 100$$

The mean result is obtained.

7. Reporting

Report the % recovery to the nearest integer. Report at 30 seconds at 25°C and if specifically requested at 30 minutes at 25°C.

Note: The spider assembly should not come into contact with the rim of the tin at any time during the recovery.

Figure 1
ASSEMBLY FOR TORSIONAL RECOVERY

