

SAMPLING PROCEDURES FOR BITUMEN AND OILS

1 SCOPE

This method describes the procedure for sampling for testing purposes of bituminous binders, cutting or fluxing oils or combinations thereof from bulk storage tanks, ship tankers, rail or road tankers, sprayers, drums and pavements by random or systematic methods.

2 SAFETY

This method does not attempt to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this method to establish appropriate occupational health and safety practices that meet statutory regulations.

Extreme caution should be exercised when sampling hot bitumen, cutbacks or blends, as there is a severe risk of injury due to burns or fire. Protective clothing must be worn and no smoking is permitted in the general vicinity.

Low pressure in-line sampling cocks (as shown in Figures 1 and 2) should only be installed on the suction side of a bitumen pump, ie. they are never to be installed on the pressure side.

3 DEFINITIONS

(a) A **lot** is any quantity of material, or portion of construction, which has been produced by essentially the same process which is subject only to random variation and can therefore be accepted as being of homogeneous quality.

NOTE: An example of a lot would be the quantity of material produced during a single batching process.

(b) A **sample site** is the position within a lot, or section, at which a single sample increment, or test sample, is taken or at which a single in situ test is performed.

(c) A **sample increment** is the basic unit of sampling and shall consist of a quantity of material taken from a sample site.

(d) A **bulk sample** is produced by taking a set of sample increments of approximately equal quantities from a lot, or section, and thoroughly mixing to provide a single uniform sample. A bulk sample may be reduced by sample division.

(e) A **test sample** is the material for examination and/or testing and may be derived from a bulk sample by sample division or may consist of a single sample increment.

4 APPARATUS

The following apparatus may be required depending on the procedure being used for sampling.

(a) **Sample containers** minimum 2 litre capacity double-tight friction-top tins.

NOTE: New paint tins with handles have been found to be satisfactory.

(b) Low Pressure in-line **sampling cock**. Suitable designs are shown in Figures 1 & 2.

(c) High Pressure in-line **sampling cock**.

(d) Weighted **sampling bottle**.

(e) **Core cutter** with a diamond bit minimum 100mm diameter, complete with air or water supply.

(f) Flat trays, sample tins or clean bags for pavement samples.

(g) **Diamond or compound saw**.

(h) **Sampling tools**, eg shovel, scoop.

5 PROCEDURE

5.1 General

Sampling of bitumen is carried out for two principal purposes.

- **Quality control, quality assurance and auditing**

Bulk Storage-Sampling During Transfer or Circulation (Procedure 5.2)

Bulk Storage-Sampling When There is No Transfer or Circulation (Procedure 5.3)

Sampling from Drums (Procedure 5.4)

- **Evaluation of existing pavements**

Sampling from Pavements (Procedure 5.5)

Sampling for these purposes may be random or systematic as required. The reason for sampling should be considered and the appropriate sampling procedure adopted.

5.2 Bulk Storage - Sampling During Transfer or Circulation

Sampling during transfer or circulation may be carried out when material in storage tanks, rail or road tankers, ship tankers, sprayers (see note) or drums is flowing through a pipeline or hose and a suitable in-line sampling cock is available.

NOTE: Samples may be taken from a sprayer when the material is being circulated through the spray bar. The sample shall be taken when the sprayer is stationary by placing a sample container on the ground beneath a spray nozzle and carefully turning on the nozzle manually.

5.2.1 Random Sampling

(a) Select the quantity of material or duration of transfer, which will constitute the lot to be sampled.

(b) Determine the required number of, and the random manner in which, test samples are to be taken.

NOTES:

(i) The required number of samples will vary according to the reason for sampling or testing. In sampling and testing associated with the execution of contracts the number of samples or test will normally be specified in the contract document. In other cases the number will normally be stipulated by the Engineer concerned or by the officer in charge of the laboratory. The number should be related to the variability of the material in question and the confidence required in the test results.

(ii) Random sampling can provide an unbiased estimate of both the average quality and the variability in quality of a lot. Random sampling implies that an equal chance of selection should apply for all possible portions of materials within the lot or population under review. The use of random number tables or generators will aid this selection process. Within the lot, sample sites (ie test results) need to be independent of each other for valid statistical analysis. Two sample sites are said to be independent when the probability of occurrence of a test result at one does not alter the probability of occurrence of the test result at the other. That is, the sample sites must not be taken too close to each other because nearby sample sites will have been subjected to the same influences.

(c) Fit a thoroughly clean and dry sampling cock in position (if not already fitted).

(d) Open the sampling cock and discharge to waste about 4 litres of material to ensure there is no contamination of subsequent samples.

NOTE: Where the cleanliness of a sampling cock cannot be easily verified, at least 4 litres of material should be discharged to waste.

(e) Take each test sample by discharging material from the sampling cock into a clean container taking care to avoid spillage (see note). Take a test sample of at least 1 litre. Seal the container as soon as possible after sampling.

NOTE: Allow sufficient room for expansion or contraction of the material in the container.

(f) If only a representative value of a material property is required and not its variability, then all test samples from a lot may be combined to give a single bulk sample provided the test samples are of approximately the same size and the test property is not distorted by this procedure.

NOTE: Combination of test samples from a lot is only acceptable when testing properties, the average value of which will not significantly change whether the result is obtained by testing the combined test samples or by testing individual test samples and computing the average.

(g) Record and identify each test sample in accordance with Procedure 6.

5.2.2 Systematic Sampling

(a) Determine the number of test samples required.

NOTE: Refer to Note (i) of Procedure 5.2.1(b).

(b) Fit a thoroughly clean and dry sampling cock in position (if not already fitted).

(c) Open the sampling cock and discharge to waste about 4 litres of material to ensure there is no contamination of subsequent samples.

NOTE: Refer to Note to Procedure 5.2.1(d).

(d) Take at least one systematically selected (see note i) sample increment for each test sample by discharging material from the sampling cock into a clean container taking care to avoid spillage (see note ii). Take a test sample of at least 1 litre. Seal the container as soon as possible after sampling.

NOTES:

i. Systematic sampling is frequently used to provide a representative test sample. The combination of systematically selected sample increments can be used to provide an unbiased estimate of average material quality but not variability in material quality. Systematic sampling does not necessarily refer to regular sample site selection but allows the frequency of sampling and the location of sample sites to be chosen to suit the reasons for sampling. For example, sample sites may be chosen at close intervals during the start up of a production shift to establish the quality of the batch, then once the quality has been established the sampling frequency may be decreased. Pavement sample sites may be required at regular intervals transversely and longitudinally over the section concerned, or at sites of specific features.

ii. Refer to Note to Procedure 5.2.1(e).

(e) Record and identify each test sample in accordance with Procedure 6.

5.3 Bulk Storage - Sampling when there is no Transfer or Circulation

This section refers to sampling material from storage tanks, rail tankers, road tankers, sprayers or mobile storage tanks when the material is not being transferred or circulated through a pipeline or hose. The nature of bulk storage tanks only permits the use of a systematic sampling plan or spot sampling. Sampling cocks fixed directly to the tank or its outlet or sampling bottles may be used.

The use of fixed sampling cocks only allows a sample increment to be taken from material in the immediate vicinity of the sampling cock. This material may not be representative of the contents of the tank. This sampling method should only be used where there are no other options for obtaining a test sample.

5.3.1 Sampling Cock Method

(a) Determine the number of test samples required.

NOTE: Refer to Note (i) of Procedure 5.2.1(b).

(b) Open the sampling cock and discharge to waste about 4 litres of material to ensure there is no contamination of subsequent samples.

NOTE: Refer to Note to Procedure 5.2.1(d).

(c) Take at least one systematically selected (see note i) sample increment for each test sample by discharging material from the sampling cock into a clean container taking care to avoid spillage (see note ii). Take a test sample of at least 1 litre. Seal the container as soon as possible after sampling.

NOTES:

i. Refer to Note (i) of procedure 5.2.2(d)

ii. Refer to Note of Procedure 5.2.1(e).

(d) Record and identify each test sample in accordance with Procedure 6.

5.3.2 Sampling Bottle Method

(a) Determine the number of test samples required.

NOTE: Refer to Note (i) of Procedure 5.2.1(b).

(b) Take at least one systematically selected sample increment for each test sample by lowering the closed sampling bottle to the required depth and opening the bottle, allowing it to fill.

NOTE: Refer to Note (i) to Procedure 5.2.2(d).

(c) Remove the bottle and transfer the contents into a clean container taking care to avoid spillage. Take a test sample of at least 1 litre. Seal the container as soon as possible after sampling.

NOTE: Refer to Note to Procedure 5.2.1(e).

(d) Record and identify the test sample in accordance with Procedure 6.

5.4 Sampling from Drums

Sampling from drums may be carried out randomly or systematically, however the nature of drums only permits the use of a random sampling plan when the material is sufficiently liquid to flow easily.

5.4.1 Random Sampling

(a) Select the quantity of material which will constitute the lot to be sampled.

(b) Determine the required number of, and the random manner in which, the drums to be sampled will be selected.

NOTE: Refer to Notes of Procedure 5.2.1(b).

(c) Take each test sample in accordance with Procedure 5.4.3.

(d) If only a representative value of a material property is required and not its variability, then all test samples from a lot may be combined to give a single bulk sample provided the test samples are of approximately the same size and the test property is not distorted by this procedure.

NOTE: Refer to Note to Procedure 5.2.1(f).

(e) Record and identify each test sample in accordance with Procedure 6.

5.4.2 Systematic Sampling

(a) Determine the number of test samples required.

NOTE: Refer to Note (i) of Procedure 5.2.1(b).

(b) Take at least one systematically selected sample increment for each test sample in accordance with Clauses 5.4.3 or 5.4.4 as appropriate.

NOTE: Refer to Note to Procedure 5.2.2(d).

(c) Record and identify each test sample in accordance with Procedure 6.

5.4.3 Liquid Material

Agitate the drum to ensure a single uniform sample is provided then take a test sample or sample increment using either a sampling cock, sampling bottle or a pump (see Note i). Transfer the material to a clean container taking care to avoid spillage (see Note ii). Take a test sample of at least 1 litre. Seal the container as soon possible after sampling.

NOTES:

i. To avoid contamination it may be necessary to discharge to waste the initial material withdrawn.

ii. Refer to Note of Procedure 5.2.1(e).

5.4.4 Solid Material

Take a test sample or sample increment from a sample site at least 100 mm below the surface and at least 100 mm from the side of the container. A clean hatchet may be used if the material is hard enough to shatter, or a broad stiff knife if the material is soft. Transfer the material to a clean container. Take a test sample of at least 1 litre. Seal the container as soon as possible after sampling.

NOTE: Refer to Note to Procedure 5.2.1(e).

5.5 Sampling from Pavements

This method is intended for the sampling of bitumen for pavement investigations. The sample may be cut from the pavement using a cutting disc, corer or manual tools such as crowbar or pick. This method is not intended for sampling for quality control or quality assurance testing.

5.5.1 Random Sampling

(a) Determine the boundaries of the lot to be sampled or tested.

(b) Determine the required number (see Note i) and the random manner (see Note ii) in which test samples are to be taken.

NOTES:

i. Refer to Note (i) of procedure 5.2.1(b).

ii. Refer to Note (ii) of Procedure 5.2.1(b).

(c) Take each test sample by cutting around the boundary of the sample site taking care to ensure minimum disturbance of the slab. Suitable cooling may be used if required.

(d) Cut the test sample to or beyond the full depth of the layer being sampled.

(e) Remove the test sample with the minimum disturbance of the slab and place in a clean container. Sample sufficient material to satisfy the requirements of all proposed tests.

(f) Record and identify each test sample in accordance with Procedure 6.

5.5.2 Systematic Sampling

(a) Determine the number of test samples required.

NOTE: Refer to Note (i) of Procedure 5.2.1(b).

(b) Determine the boundaries of the section to be sampled.

(c) Systematically select the location of the sample sites in accordance with an appropriate systematic sampling plan.

NOTE: Refer to Note (i) of Procedure 5.2.2(d).

(d) Take each test sample by cutting around the boundary of the sample site taking care to ensure minimum disturbance of the slab. Suitable cooling may be used if required.

(e) Cut the test sample to or beyond the full depth of the layer being sampled.

(f) Remove the test sample with the minimum disturbance of the slab and place in a clean container. Sample sufficient material to satisfy the requirements of all proposed tests.

(g) Record and identify each test sample in accordance with Procedure 6.

6 RECORDING AND IDENTIFICATION

All samples should be marked with an identifying mark and label and all or some of the following information should be recorded:

- identification of storage vessel
- identifying mark
- date of sampling
- type of material, classification of bitumen
- source or location
- amount of material represented
- name of sampling operator
- sampling method used (Procedure number eg. WA 700.1, Clause 5.2)
- contract number, batch number
- supplier of material.

7 FIGURES

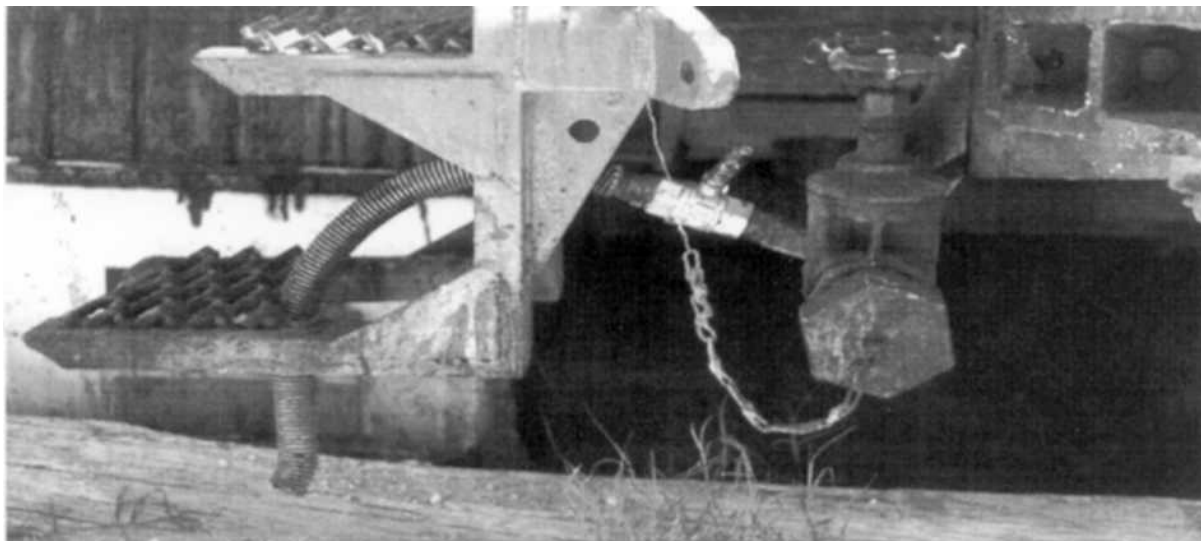


FIGURE 1
FIXED SAMPLE COCK ON TANK OUTLET



FIGURE 2
DETACHABLE IN LINE SAMPLE COCK

8 ISSUING AUTHORITY

Document Owner	Delegated Custodian
Manager Materials Engineering	Pavements Manager

9 REVISION STATUS RECORD

Page No.	Section	Revision Description / Reference
All	All	Format Revision and Re-issue of Test Method