



# SAMPLING AND STORAGE OF ASPHALT

## 1 SCOPE

This method describes procedures for the sampling and storage of asphalt for the purpose of testing.

## 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.

Sampling of asphalt may involve, amongst other things, the handling of hot materials and interaction with plant and transport vehicles. Personnel should comply with relevant work site safety procedures and only undertake sampling when safe and easy access is provided.

## 3 REFERENCED DOCUMENTS

### Main Roads Western Australia

- |          |  |
|----------|--|
| WA 0.1   | Random Sample Site Selection   |
| WA 730.1 | Bitumen Content and Particle Size Distribution of Asphalt and Stabilised Soil : Centrifugal Method |
| WA 730.2 | Bitumen Content and Particle Size Distribution of Asphalt: Ignition Oven Method                    |
| WA 731.1 | Stability and Flow of Asphalt : Marshall Method  |
| WA 732.2 | Maximum Density of Asphalt : Rice Method   |
| WA 733.1 | Bulk Density and Void Content of Asphalt   |

## 4 DEFINITIONS

- (a) A **lot** is any quantity of asphalt or portion of placed asphalt all of which has been produced by the same process not exceeding a period of 12 hours, which is subject only to random variation and can therefore be accepted as being of a homogenous quality.
- (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 insitu 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 mixed 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.

(f) The **Nominal Size** is the approximate smallest sieve aperture through which at least 90% of the material passes.

## 5 APPARATUS

- (a) **Tape measure** or similar device.
- (b) **Sampling tools** e.g. sampling shovel, scoop or front end loader.
- (c) **Sample Container** - metal tins with sealable lids or a metal dish, tray or bucket or single use paper lined heat resistant bag that must be clean and dry with no residues, corrosion or other materials that could change the properties of the asphalt.
- (d) **Quartermaster sample divider** (optional)
- (e) **Core cutter** with a diamond tipped bit minimum 100 mm internal diameter, complete with dry ice and air or chilled water supply.
- (f) **Core extractor**.
- (g) **Saw** – diamond or compound.
- (h) **Esky** – insulated container with a close fitting lid.
- (i) **Gloves** – heat resistant.
- (j) **Plastic Bag** – for moisture samples.
- (k) **Cling Wrap**– for moisture samples.

## 6 PROCEDURE

### 6.1 General

Sampling of asphalt is carried out for three principal purposes:

- Compliance testing of asphalt production
- Compliance testing of asphalt compaction
- Evaluation of existing pavements

Where asphalt samples are to be transported away from a mixing plant or sample site they shall be placed in metal tins and sealed.

Samples of loose asphalt to be tested for moisture content or volatile oils shall be placed in metal tins and sealed immediately.

Where a sample is taken at a mixing plant and is to be tested immediately after sampling a metal dish, tray or bucket may be used.

## 6.2 During Discharge from a Mixing Plant

### 6.2.1 Continuous Mixers

(a) Determine the number of test samples or sample increments required.

(b) Take at least two sample increments of approximately the same size, for each bulk sample, by passing the sampling tool across the full cross section of discharge or through the centre part of the curtain of falling material at a rate which prevents significant spillage of material over the sides of the tool. Take a sample during a period of continuous discharge, avoiding the first and last material to be discharged unless the purpose of sampling is to examine this part of the discharge.

(c) Combine the sample increments to form separate bulk samples and reduce each bulk sample by sample division to provide separate test samples. Take sufficient material to satisfy the requirements of Table 1 and all proposed tests.

**TABLE 1**

Mass of Test Sample		
Nominal Mix Size, mm	≥ 20	< 20
Minimum Mass (kg)	20	10

(d) Place each test sample in a separate sample container, record and identify each test sample in accordance with Procedure 8.

### 6.2.2 Batch Type Mixers

The nature of the discharge from a batch type mixing plant only permits the use of a systematic sampling plan and it is only possible to take one test sample or sample increment for each discharge.

(a) Determine the number of test samples or sample increments required.

(b) Take a sample increment approximately midway through the period of discharge of a batch by passing the sampling tool through the centre part of the curtain of falling material at a rate which prevents significant spillage of material over the sides of the tool. If more than one sample increment for each test sample has been taken, combine each set of sample increments to form separate bulk samples and reduce by sample division to provide separate test samples. Take sufficient material to satisfy the requirements of Table 1 and all proposed tests.

(c) Place each test sample in a separate sample container, record and identify each test sample in accordance with Procedure 8.

## 6.3 Trucks

(a) Select at least three sample sites systematically within the truck being sampled. The sites shall be at least 0.5 m apart and not less than 0.2 m from any side of the truck body.

(b) Remove the surface material at each sample site to a depth of approximately 0.1 m.

(c) Take sample increments of approximately equal size from the material exposed at each of the sample sites, using shielding if necessary to prevent material from falling back into the sampling excavation.

*NOTE: For larger size mixes such as 20mm DGA care must be taken to ensure the sample is representative of the body of material being sampled. The use of a mixing and splitting apparatus such as a Quartermaster may assist in obtaining a representative sample.*

(d) Combine the sample increments to form a bulk sample and then reduce by sample division to form a test sample. Take sufficient material to satisfy the requirements of Table 1 and all proposed tests.

(e) Place each test sample in a separate sample container, record and identify each test sample in accordance with Procedure 8.

## 6.4 Stockpiles

Segregation and restricted access makes it difficult to obtain representative samples from stockpiles hence sampling from other locations is preferred. The following procedure is primarily intended for cold mix which is frequently not available for sampling except in stockpiles. The procedure is intended to provide for systematic face sampling of stockpiles.

(a) Determine the number of test samples or sample increments required.

(b) Select at least three sample sites systematically for each test sample with the sites at least 0.5m apart.

(c) Remove the surface material at each sample site to a depth of approximately 0.1 m.

(d) Take sample increments of approximately equal size from the material exposed at each of the sample sites, using shielding if necessary to prevent material falling back into the sampling excavation.

(e) Combine the sample increments from each set of sample sites to form separate bulk samples and reduce each bulk sample by sample division to provide separate test samples. Take sufficient material to satisfy the requirements of Table 1 and all proposed tests.

(f) Place each test sample in a separate sample container, record and identify each test sample in accordance with Procedure 8.

## 6.5 Paver Hopper

This procedure is intended to provide for the systematic face sampling of paver hoppers. Random samples cannot be taken because of restricted access to the material.

(a) Select three sample sites systematically, for each test sample, in the hopper. The sites shall be at least 0.5 m apart. The hopper must be at least half full and the truck must be removed from the paver.

(b) Remove the surface material at each sample site to a depth of approximately 0.1 m.

(c) Take sample increments of approximately equal size from the material exposed at each of the sample sites, using shielding if necessary to prevent material falling back into the sampling excavation.

(d) Combine the sample increments to form a bulk sample into a container and then reduce by sample division to form a test sample. Take sufficient material to satisfy the requirements of Table 1 and all proposed tests.

## 6.6 Paver Augers

(a) Select at least three sample increments systematically for the test sample from the paver using a sample shovel to remove the asphalt from the augers as they place the mixed asphalt in front of the screed. The increments may be taken from any position along the augers or extension boxes where the material is freely accessible. Increments shall not be taken unless the augers are charged throughout their length.

(b) Combine each set of sample increments into a container to form separate bulk samples and reduce each bulk by sample division to provide separate test samples. Take sufficient material to satisfy the requirements of Table 1 and all proposed tests.

## 7 LAID AND COMPACTED ASPHALT

### 7.1 Sampling Procedure and Site Selection

#### 7.1.1 Compaction Testing

(a) Identify the boundaries of the lot to be sampled.

(b) Determine the required number of sample sites. Determine the location of sample sites using a stratified random sampling plan in accordance with Test Method WA 0.1.

(c) Record the location of sample sites.

(d) Take core samples at the selected sample sites in accordance with Procedure 7.2 or 7.3 as applicable.

#### 7.1.2 Moisture Content of In-Situ Asphalt

The location of sample sites shall be as directed by the person requesting sampling.

*NOTE: Sites typically selected for sampling include those with a bony surface texture, along joints, where water has ponded and areas where the surface appears to be damp.*

(a) Record the location of sample sites.

(b) Take core samples at the selected sample sites in accordance with Procedure 7.2.

#### 7.1.3 Investigation of Pavements

Determine the location of sample sites using a systematic sampling plan or as directed.

(a) Record the location of sample sites.

(b) Take core or slab samples at the selected sample sites in accordance with Procedure 7.2, 7.3 or 7.4 as applicable.

## 7.2 Laid and Compacted Asphalt - Dry Coring

This procedure is appropriate for sampling an individual layer(s) of asphalt, not exceeding 80mm in thickness, that can be cooled using dry ice, regardless of the total thickness of the asphalt below the individual layer(s).

Core samples for in-situ moisture content of asphalt may be taken at any depth in an asphalt pavement using dry ice on the upper most layer of asphalt.

(a) Place dry ice on the surface of the asphalt at the site to be cored a minimum of 20 minutes prior to coring. Place sufficient dry ice of width approximately 40 mm greater than the diameter of the core.

*NOTE: The intent is to chill the asphalt to prevent plastic deformation, which may affect the determination of the density of the asphalt.*

- (b) Position the core cutter over the chilled asphalt ensuring that the barrel of the core cutter is approximately perpendicular to the road surface.
- (c) Start the core cutter then lower it carefully to the asphalt, turn on the air supply to the core cutter and commence cutting the core.
- (d) Regulate the rate of feed of the core cutter, the speed and the air supply so that the core is cut cleanly without clogging of the barrel or diamond tipped bit, stalling of the cutter or the generation of excess heat in the asphalt.

**NOTES:**

i Care must be taken not to exert excessive pressure on the core cutter, as this will damage the diamond tipped bit and the core. If more than light pressure is required this may be due to an inadequate flow of air to clear the debris from the cut. A pressure of about 70 kPa is usually sufficient to ensure an adequate flow of air. Should the cutting edge become clogged it may be necessary to raise and lower the core cutter to free the material and allow cutting to proceed unhindered. When sampling for moisture content of in-situ asphalt the core cutter must have a sufficient amount of diamond compound so excessive heat will not be generated.

ii The apparatus shown in Figure 1 has been found to be suitable for removing dust during cutting.

**FIGURE 1**



- (e) When the required depth has been reached withdraw the core cutter from the asphalt and remove the core from the pavement without distorting or damaging it. If the core is bonded to an underlying layer of material insert the core extractor between the core and the wall of the core hole and lever the core carefully so as to avoid distorting the core. If the core refuses to release then recommence cutting to a depth where release can be obtained.

(f) Inspect the core for damage. If the core is damaged cut a new core adjacent to the existing hole in accordance with Procedure 7.2(a) to 7.2(f).

(g) When sampling for moisture content of in-situ asphalt the core shall be immediately wrapped in cling wrap and then placed in a sealed plastic bag to ensure no loss of moisture.

(h) Place the core face downwards on a flat surface in an esky chilled with dry ice and protected from the sun during transport.

**NOTE:** Cores should at all times be stored face downward on a flat surface to avoid plastic deformation. They must be handled with care to avoid damage and not stacked or otherwise loaded to avoid densification.

(i) Record and identify each core in accordance with Procedure 8.

(j) Repair the core hole using emulsion to seal the bottom of the core hole and suitable dense graded asphalt that will be stable under traffic.

**NOTE:** Where a road is surfaced with open graded asphalt or stone mastic asphalt this type of asphalt may be used to reinstate the wearing course. Where there are one or more layers of asphalt below the wearing course dense graded asphalt must be used in these layers to reinstate the core hole.

### 7.3 Laid and Compacted Asphalt - Wet Coring

This procedure shall not be used for sampling core samples for determining moisture content of in-situ asphalt.

(a) Obtain a sample in accordance with Procedure 7.2 but replace the air supply to the core cutter with a chilled water supply. The chilling of the pavement with dry ice is optional.

(b) Remove free water from the core hole and repair the core hole in accordance with Procedure 7.2(j)

### 7.4 Laid and Compacted Asphalt - Slab Sample

This procedure is not suitable for sampling for compliance testing of compacted asphalt. This procedure is intended for the sampling of asphalt for pavement or failure investigations when mix properties are to be determined. The slab may be cut using a cutting disc or manual tools.

(a) Cut around the boundary of the test sample taking care to ensure minimum disturbance of the slab. Water or air cooling may be used if required.

(b) Cut an approximately rectangular sample of asphalt to or beyond the full depth of the layer being sampled.

(c) Remove the test sample with minimum disturbance.

(d) Place the test sample face down on a flat surface protected from sun and heat.

(e) Remove free water from the sample site and repair in accordance with Procedure 7.2(j).

(f) Record and identify each test sample in accordance with Procedure 8.

## 8 PACKAGING AND IDENTIFICATION OF SAMPLES

All samples shall be marked with an identifying mark or label and all of the following information is to be recorded.

- Identifying mark or when there is more than one sample container for the same sample, each sample container shall be marked with the same identification and numbered separately including the total number of sample containers
- Date laid
- Nominal size and mix type
- Binder type
- Manufacturer
- Paving contractor
- Date and time of sampling
- Type of material
- Source or location
- Name of sampling operator
- Sampling procedure used for loose asphalt.

## 9 STORAGE OF ASPHALT

The following procedure is applicable to samples of loose hot mixed asphalt that has been sampled whilst the asphalt is hot, which may be tested at a later time. The sample shall be allowed to cool to ambient conditions after it has been taken and shall not be heated until such time as the asphalt is to be tested. Samples shall be stored in sealed sample containers to minimise oxidation.

9.1 For each sample to be stored mark the sample containers in accordance with Procedure 8.

9.2 Transport the sample containers to the storage facility in a manner that will not damage the integrity of the sample container or the sample. Samples shall be protected from moisture, solvents or direct heat after sampling and during transport.

9.3 Store samples at an appropriate storage facility, under cover from the elements and protected from damage or contamination.

9.4 The properties of stored samples of asphalt should be determined within the time limits shown in Table 2.

**TABLE 2**

<i>Property of Asphalt</i>	<i>Maximum Storage Period</i>
Stability and Flow WA 731.1	1 month (see note)
Marshall Density WA 731.1	2 months
Rice Density WA 732.2	2 months
Particle Size Distribution and Binder Content WA 730.1	2 years

*NOTE: The effects of steric hardening of the binder due to reheating and the additional hardening of thin films of binder in the asphalt due to oxidation reduce the reliability of Stability and Flow tests results after the initial batching.*

## 10 Reporting

- Reference to method
- Date laid
- Binder Type
- Nominal size and mix type
- Manufacturer
- Paving contractor
- Date and time of sampling
- Tonnage of days production when sample taken for loose asphalt
- Source or location
- Lot Identification and boundary locations
- Sampling procedure used for loose asphalt

**11 ISSUING AUTHORITY**

Document Owner
Bituminous Products Consultant

**12 REVISION STATUS RECORD**

Date.	Section	Revision Description / Reference
Jan 2024	3	Add WA 730.2
Jan 2024	5c,e & k	Update to Apparatus requirements
Jan 2024	6.5, 6.6	Clarification
Jan 2024	7.2	Terminology - Minimum replaced average
Jan 2024	8	Update of information required
Jan 2024	10	New section 10. Reporting