

Subject: LIQUID ASPHALT SAMPLING AND TESTING for the Ministry's Quality Audit	
Date: July 4, 2019	Author: Manoj Jogi
Bulletin Number: GM18001 Bulletin Type: Sampling Procedure	Action Required: Immediate Effective Date: July, 2019
Contacts	Standards Affected
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1.0 Purpose:

The purpose of this Technical Bulletin is to establish a procedure for sampling liquid asphalt binder used for the Ministry's projects and testing the samples for quality audit purposes to ensure liquid asphalt provided by the Suppliers/Contractors meet standard specification SS 952 and the special provisions.

2.0 Background:

Liquid asphalt binder is a major factor impacting the cost and quality of asphalt concrete paving. It is important to ensure that an adequate quality assurance (QA) mechanism is in place for the sampling and testing of liquid asphalt binder. By following proper procedures, samples can be obtained that are representative of the material used for the project. These samples can be tested to ensure that the liquid asphalt binder meets the minimum quality requirements for the project, as identified in standard specification SS 952 and the special provisions.

3.0 Sampling Quantity and Frequency:

- Number of samples to be collected may be as follows.
- Contracts with asphalt concrete mix quantity > 50,000 tonnes – 2 samples
- Contracts with asphalt concrete mix quantity 5,000 to 50,000 tonnes – 1 samples
- Contracts with asphalt concrete mix quantity < 5,000 tonnes – waive at the ministry Representative recommendation.
- The Ministry may require additional samples based on individual project conditions.
- The quantity for each liquid asphalt binder product sample above shall be 3 x 1 liter (minimum). This includes two 1 liter samples for testing and one 1 liter sample for appeal testing.
- The type of testing to be carried out and the number of samples to be tested shall be based on the Ministry's requirements.

4.0 Apparatus / Equipment:

1. Sample containers – Sample containers for liquid asphalt samples shall be double seal friction-top cans, square cans with screw tops or small-mouth cans with screw caps. The container and the top shall fit together tightly.
2. Insulated safety gloves
3. Face shield, protective clothing
4. Clean, dry cloth
5. Dry, clean metal containers (1.5-4 liters).
6. A clean container larger than five liters (required to collect material drawn off from sampling device prior to taking sample).

5.0 Protection and Preservation of Samples:

- Sample containers shall be clean, dry and free of dirt or other foreign matter. The size of sample container shall be sufficient to accommodate approximately 1 liter sample with 12 – 15 mm free space on top of the sample.
- The filled sample container shall not be submerged in solvent, nor shall it be wiped with a solvent saturated cloth. If cleaning is necessary, a dry clean cloth shall be used. The samples shall not be transferred from one container to another except where required by the sampling procedure.
- Any volatile material or contaminants of any kind shall not be allowed to come in contact with the samples, containers, and cleaning cloths under any circumstances.
- Care shall be taken to ensure that the sample of asphalt binder is representative and that the properties are unaffected by handling, shipping and storage of the sample before testing.
- Samples that have been stored for more than 90 days after the sampling date shall not be tested.

6.0 Sampling Procedure:

a. General:

1. All samples shall be obtained by a person experienced with procedures for sampling and handling liquid asphalt binder. This person shall be responsible for following proper sampling procedure, so as to avoid the procurement of poor samples or related safety issues.
2. Samples shall be collected by the Contractor in the presence of the Ministry Representative. Once samples are obtained, they shall be immediately handed over to the Ministry Representative.
3. The Ministry Representative shall arrange to ship the sample to a suitable Testing Lab as soon as practical.
4. Use of filters or screens shall not be allowed in sampling devices or nozzles.

5. Sample container shall not be overfilled. Ideally 12 - 15 mm free space on top of the liquid asphalt binder in the sample container is recommended.
6. Friction lids shall be placed loosely on the sample container until the sample has cooled to room temperature. At that point lids can be firmly tapped in place.
7. Screw tops shall be screwed tightly to seal the sample container after the asphalt binder has cooled to room temperature.
8. Sample shall be prevented from leakage, contamination and exposure to freezing during handling, shipping and storage.

b. Sampling from a Storage Tank:

1. This method works best for a tank that contains an operating mechanism (such as mechanical agitator) to ensure uniformity of material contained within it.
2. Ensure that the valve on the tank tap is closed and any opening in the spout is not plugged with solidified asphalt binder.
3. Open the valve while standing away and upwind from the valve. Allow at least 4 liters of material to flow into a waste container before sampling to ensure that a representative sample is obtained.
4. Close the valve.
5. Cover the sample container with a sheet of paper around it to keep the exterior clean while sampling.
6. Fill the sample container from the valve on the tank tap.
7. The flow of asphalt into the sample container shall be slow and steady while sampling.
8. Care shall be taken to avoid spilling any material outside the sample container or overfilling the container.
9. The lid shall be placed loosely on the sample container until the sample has cooled room temperature. At that point the lids can be firmly tapped in place.
10. If tank taps are not available, the samples are obtained by “dipping”. In this method, a weighted container is lowered into the tank. The container is fitted with a stopper and is removable by a string or wire when the container is at proper depth in the tank.
11. The practice of “dipping” is not preferred for asphalt binder sampling from a storage tank.

c. Sampling Using Truck/Tanker Mounted Sampling Valve:

1. The samples from the tanker mounted sampling valve shall be obtained prior to or at the beginning of the loading operation.
2. The truck operator must be notified prior to obtaining the sample.
3. Ensure that the valve is closed and the opening in the spout is not plugged with solidified asphalt binder.

4. Open the valve while standing away and upwind from the valve. Allow at least 4 liters of material to flow into a waste container sampling to ensure that a representative sample is obtained.
5. Close the valve.
6. Cover the sample container with a sheet of paper around it to keep the exterior clean while sampling.
7. Hold the sample container under the opening and slowly open the valve.
8. The flow of asphalt into the container shall be slow and steady to prevent splashing of hot material while sampling.
9. If steps 7-8 are not practical, permit the material to flow into a dry, clean container and transfer a portion into the sample container.
10. Care shall be taken to avoid spilling any material outside the sample container or overfilling it.
11. Fill the sample container within 12 – 15 mm of the top.
12. Shut off the valve and remove the sample container. The asphalt remaining in the spout shall be allowed to drip into the waste container.
13. When asphalt stops dripping, wipe the spout clean and replace the cap.
14. The lid shall be placed loosely on the sample container until the sample has cooled to room temperature. At that point, the lid can be firmly tapped in place.

d. Sampling Using In-Line Sampling Valve:

1. The samples from an in-line sampling valve shall be obtained after one third and no more than two thirds of the load has been removed from the hauling unit.
2. The truck operator must be notified prior to obtaining the sample.
3. The unloading pump shall be turned off prior to obtaining a sample from the in-line valve.
4. Follow steps 3-14 from section c above.

e. Sampling from Mixing Plant:

1. This method shall be performed with assistance from the mixing plant operator. The mixing plant shall be in operation while the sample is taken.
2. The plant shall be allowed to operate a minimum of one hour before samples are taken.
3. Samples shall be taken from sampling valves located in the pumping line, (line from storage tank to the mixer).
4. Follow steps 3-14 from section c above.

7.0 Sample Identification / Labelling:

- Immediately after filling, sealing and cleaning the sample container it must be properly identified with a suitable marker. Write on the container itself and not on the lid.
- Labels or tags used shall be fastened to the container in such a manner to ensure that they will not be lost during handling, transportation and storage. Labels or tags shall not be attached using the lid.
- Following is an example of a sample label.

Liquid Asphalt Binder Sample Label Information

SAMPLE DETAILS	
Project / Contract #	
Project Location	
Delivery / Invoice #	
Date Sampled	
Sampled by	
Date Received	
Type of Asphalt Binder (PG or Pen grade details)	
Asphalt Supplier Name	
Contractor Name	
Sampling Point (mixing plant, storage tank or truck/tanker)	

8.0 Testing Requirements:

All liquid asphalt binder samples shall be tested in accordance with the requirements in Table 1. Test methods used shall confirm to the standard ASTM or AASHTO tests, or to the CGSB test as listed in SS 952, Table 952-A supplemented by such special tests as may be described elsewhere to cover special or experimental type materials.

Table 1 Testing Requirements for Liquid Asphalt Binder

PENETRATION GRADE ASPHALT BINDER	Notes
Requirements	
<i>Unaged Asphalt</i>	
Penetration at 25°C, 100 g and 5 s, 0.1 mm	
Absolute Viscosity at 60°C	
Kinematic Viscosity at 135°C	
Flash Point, °C, Cleveland Open Cup	
Solubility in Trichloroethylene % by Mass	
Ductility, 25°C 5 cm/min, cm	
Ductility, 15°C 5 cm/min, cm	
Thin Film Oven Test % Loss in Mass	
<i>Aged Asphalt (TFO or RTFO)</i>	
Penetration of Residue at 25°C 100 g, 5 s, 0.1 mm, % of Original Penetration	
Absolute Viscosity at 60°C	
Kinematic Viscosity at 135°C	
Ductility, 25°C 5 cm/min, cm	
Ductility, 15°C 5 cm/min, cm	
PERFORMANCE GRADE ASPHALT BINDER	Notes
Requirements	
Solubility in Trichloroethylene % by Mass	
Flash Point, °C, Cleveland Open Cup	
Rolling Thin Film Oven Test % Loss in Mass	
Full set of testing as per AASHTO M 320 OR AASHTO R29	
GENERAL	Notes
Multiple Stress Creep Recovery (MSCR) as per AASHTO T350	
The Ministry may choose to perform following testing to further investigate use of Re-refined Engine Oil Bottom (REOB) for modifying the liquid asphalt binder. Additional testing may be conducted as required.	
Ash content as per ASTM D8078	
X-Ray Fluorescence (XRF), Fourier Transform InfraRed (FTIR) Spectroscopy	
Double Edged Notched Tension (DENT) test	

9.0 Appeal Testing (if required):

The Contractor may appeal the test results for the liquid asphalt binder samples tested by the Ministry. The Contractor can appeal the test results only when the test results show that the material sample tested does not meet the specifications requirement for that material. Appeal will only be considered if the Contractor's Quality Control testing results support an appeal and can be presented. If appeal testing is applied for any property, all properties shall be tested for appeal testing.

The Ministry Representative will arrange for an independent testing laboratory to perform the appeal testing. The personnel employed and the testing laboratory retained by the Contractor for Quality Control testing on the project shall not be used for appeal testing.

The appeal testing laboratory shall hold current certification from the Canadian Council of Independent Laboratories (CCIL) under the Asphalt Laboratory Certification Program, and at least one technician in the asphalt laboratory shall hold current certification under the Asphalt Technician Certification Program. Appeal laboratory having current certification from AASHTO are also acceptable.

For the appeal testing, if the test results from appeal lab indicate that the material is out of specification, Contractor shall be responsible for cost of appeal testing.

10.0 Safety:

Safety precautions are required when sampling and handling asphalt materials. Following are the general safety precautions to be observed when sampling.

- Assessing hazards with associated work.
- Determining and using appropriate hazard mitigation strategies, to remove or eliminate hazards and prevent spills and worker exposure.
- Having product MSDS sheets readily available and following WHMIS and WSBC requirements for safe handling.
- Taking precautions to prevent spillage of material to avoid personal safety and environmental hazards.
- Taking precautions to prevent fire or explosion with the handling or storage of materials.
- Using the Emergency Response Guidebook and other available resources for any emergencies.
- Specific precautions as required for each individual project.

11.0 References:

AASHTO M320, AASHTO R29, AASHTO R66
ASTM D140

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