1038.01 Scope.  
1. This method covers the procedure for the quantitative determination of bitumen in hot-mixed pavement mixtures and pavement samples.

2. The aggregate remaining may be used for sieve analysis according to AASHTO T 30, Mechanical Analysis of Extracted Aggregate.

Note1: Although bitumen, by definition, is material soluble in carbon disulfide, trichloroethylene is used in this method for safety reasons.

1038.02 Summary of Method.  
1. The paving mixture is extracted with a suitable solvent using the extraction equipment. The bitumen content is calculated by difference between the mass of the original sample and the mass of the extracted aggregate and ash from an aliquot of the extract.

1038.03 Apparatus.  
1. Oven, capable of maintaining the temperature at 230 ± 9°F (110 ± 5°C).

2. Pan, flat, 14 inches (350mm) long, 10 inches (250mm) wide and 2.5 inches (65mm) deep.

3. Balance: A balance conforming to the requirements of AASHTO M 231, Class D shall be provided.
4. Balance: A balance conforming to the requirements of AASHTO M 231, Class E capacity 15 kg or more.

5. Hot Plate: Electric with adjustable heating rate.


7. Ignition Dish, 120 ml capacity.

8. Balance: A balance conforming to the requirements of AASHTO M 231, Class C.

9. Muffle furnace or gas burner capable of maintaining temperatures between 500 and 600°C.

1038.04 Solvent.

1038.05 Preparation of Sample and General Requirements for weighing.

1. Place mixture in a large flat pan and dry to constant weight in an oven at a maximum temperature of 230°F(110°C).

2. The test sample shall consist of the entire sample or the end result of splitting or quartering a large sample conforming to AASHTO T 168 (Sampling Bituminous Paving Mixtures). The size of the test sample shall be governed by the nominal maximum aggregate shown in the following table.

<table>
<thead>
<tr>
<th>Nominal Maximum Aggregate Size</th>
<th>Standard (mm)</th>
<th>Alternate</th>
<th>Minimum Mass of Sample (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4.75</td>
<td>No. 4</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>9.5</td>
<td>3/8&quot;</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>12.5</td>
<td>½&quot;</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>19.0</td>
<td>3/4&quot;</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>25.0</td>
<td>1&quot;</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>37.5</td>
<td>1 ½&quot;</td>
<td>4</td>
</tr>
</tbody>
</table>
Note 2: When the mass of sample is greater than the maximum capacity of the extraction equipment, divide the sample into approximately equal portions for testing. The masses for calculations will then be the sum of like masses of the test portions.

3. Weighing of extraction test apparatus and/or samples shall be done on a balance meeting the requirements of 1038.03 part 3 when the capacity is sufficient; otherwise, a balance meeting the requirements of 1038.03 part 4 shall be used.

1038.06 Apparatus
1. In addition to the apparatus listed in section 1038.03, apparatus similar to that shown in Figure 1, AASHTO T 164(76), Method A, is required.

   1.1 Extraction Apparatus, consisting of a bowl approximately that shown in Figure 1 and an apparatus in which the bowl may be resolved at controlled variable speeds up to 3600 rpm. The apparatus shall be provided with a container for catching the solvent thrown from the bowl and a drain for removing the solvent.

Note 3: Similar apparatus of large size may be used.

   1.2 Filter Ring: A smooth, white, medium fast filter paper of a diameter at least equal to the bowl sealing surfaces outside diameter and to internally exceed the bowl sealing surface width by at least 25.4 mm (1 inch).

1038.07 Procedure
1. Weigh a 1000 to 3000g sample into the bowl.

2. Cover the sample in the bowl with trichloroethylene and allow sufficient time for solvent to disintegrate the sample (not over 1 hour). Place the bowl containing the sample and the solvent in the extraction apparatus. Fit the filter ring around the edge of the bowl. Clamp the cover on the bowl tightly and place a graduated container under the drain to collect the extract.

3. Start the centrifuge revolving slowly and gradually increase the speed to a maximum of 3600rpm or until solvent ceases to flow from the drain. Allow the machine to stop, add 500 ml trichloroethylene and repeat the procedure. Use sufficient 500 ml solvent additions (not less than three) so that the extract is clear and darker than a light straw color. Collect the extract and the washings in a suitable graduate.

4. Remove as much of the mineral matter adhering to the ring as possible and add to the aggregate in the bowl. Dry the contents of the bowl to a constant mass in an oven at 110 ± 5C (230 ± 9F) or on a hot plate.
Note 4: The sample shall be dried until further drying at 110 ± 5°C (230 ± 9°F) does not alter the mass 0.1 percent, the precision of weighing.

5. Record the volume of the total extract in the graduate. Agitate the extract throughly and immediately measure approximately 100 ml into a previously weighed ignition dish. Evaporate to dryness on a hot plate. Burn the residue at a dull red heat (500 to 600°C), cool, and weigh.

1038.08 Calculations
1. The mass of the mineral matter in the total volume of extract as follows:

\[
G = \frac{V_1}{V_1 - V_2}
\]

where:
- \( G \) = mineral matter in grams
- \( V_1 \) = total volume in milliliters, and
- \( V_2 \) = volume after removing aliquot in milliliters.

2. Calculate the percentage of bitumen in the sample as follows:

\[
\text{Bitumen content of dry sample, percent} = \frac{W_1 - (W_2 + W_3)}{W_1} \times 100
\]

where:
- \( W_1 \) = mass of sample
- \( W_2 \) = mass of extracted mineral matter, and
- \( W_3 \) = mass of mineral matter in extract.

1038.09 Report
1. The bitumen content shall be reported to the nearest 0.1 percent.