



## Performance Examination - Asphalt

### Standard Test Method for Theoretical Maximum Specific Gravity and Density of Asphalt Mixtures (ASTM D2041 / D2041M-11)

Candidate Name: \_\_\_\_\_ NICET ID: \_\_\_\_\_

Apparatus	Trial 1	Trial 2
<b>Containers</b> Use one of the six types below		
<i>To be used for weighing in air and water</i>		
<b>Type A</b> Bowl of glass, metal, or plastic		
Approx. 2000 ml capacity		
Cover fitted with rubber gasket and hose connection		
<b>Type B</b> Thick-wall filter flask or thick-wall vacuum desiccator		
Approx. 2000 ml capacity		
Provided with a rubber stopper with hose connection		
<i>To be used for weighing in air only</i>		
<b>Type C</b> Small volumetric flask		
Approx. 2000 ml capacity		
Provided with a rubber stopper with hose connection		
<b>Type D</b> Intermediate-size heavy-wall glass pycnometer		
Approx. 4000 ml capacity		
Provided with suitable vacuum connection assembly consisting of a vacuum gauge, release valve and tubing connector, plus a tapered stopper device for maintaining consistent volume regulation		
<b>Type E</b> Metal vacuum pycnometer covered with clear poly lid		
4500 ml capacity		
<b>Type F</b> Large size plastic pycnometer		
At least 10,000 ml capacity		
Provided with suitable vacuum connection assembly		
<b>Balance</b> With ample capacity and with sufficient sensitivity to enable the specific gravity to be calculated to at least four significant figures (to at least three decimal places) <i>For Type A: Balance equipped with a suitable suspension apparatus and holder to permit weighing the sample while suspended in water</i>		
<b>Vacuum Pump or Water Aspirator</b> Capable of evacuating air from the container to a residual pressure of 4.0 kPa (30 mm Hg) or less (preferably to zero) <i>When vacuum pump is used, a suitable trap of one or more 1000 ml filter flasks (or equivalent) should be between the vacuum source and the vacuum vessel</i>		
<b>Residual Pressure Manometer</b> Connected at the end of the vacuum line using an appropriate tube and either a "T" connector on top of the vacuum vessel or by using a separate opening in the top of the vessel		

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Apparatus (continued)	Trial 1	Trial 2
<b>Manometer or Vacuum Gauge</b> Connected either directly to the vacuum source or in vacuum line close to the source		
<b>Calibrated Liquid-Glass Thermometer</b> Subdivisions and maximum scale error 0.5 °C (0.9 °F). Any other thermometric device of equal accuracy, precision and sensitivity is acceptable		
<b>Water Bath</b> ( <i>Types A &amp; B only</i> ) Can maintain a constant temperature between 20 and 30 °C; Must be large enough for immersion of container and sample		
<b>Bleeder Valve</b> Attached to the vacuum train		
<b>Apparatus for Supplemental Procedure for Mixtures Containing Porous Aggregate Not Completely Coated</b> <i>If laboratory determines the specific gravity of mixtures containing porous aggregate, the following must be on hand:</i>		
<b>Electric Fan</b>		
<b>Towel for Decanting Water from Aggregate</b>		
<b>Flask or Bowl Calibrated</b>		

Procedures	Trial 1	Trial 2
1. Obtain sample by splitting or quartering		
2. Determine the mass of sample based on ASTM Standards		
3. Particles of the sample separated		
4. Care used not to fracture mineral fragments		
5. After separation, fine aggregate particles not larger than 6.3 mm (¼ in.)		
6. Dry to constant mass in the oven at 105 ± 5 °C (221 ± 9 °F), or any other method of drying, unless the mixture is laboratory prepared		
7. Sample at room temperature		
8. Place in tared flask or bowl; determine weight and net mass of sample		
9. Cover sample with water at approx. 25 °C (77 °F)		
10. Vacuum increased until manometer reads 3.7 ± 0.3 kPa (30 mm Hg or less)		
11. A container within a container shall not be used		
12. Remove entrapped air using partial vacuum for 5 - 15 min		
13. Continuously agitate container and contents by a mechanical device or manually by vigorous shaking at intervals of about 2 min		

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Procedures (continued)	Trial 1	Trial 2
<b>Weighing-in-water determination</b>		
1. Suspend bowl (container) and contents in water at $25 \pm 1$ °C ( $77.0 \pm 1.8$ °F)		
2. Determine Net mass of contents in water after $10 \pm 1$ min immersion		
3. If the temperature is not $25 \pm 1$ °C ( $77.0 \pm 1.8$ °F), mass corrected to 25 °C (77 °F)		
<b>Weighing-in-air determination</b>		
1. Fill flask (container) with water		
2. Contents adjusted to $25 \pm 1$ °C ( $77.0 \pm 1.8$ °F)		
3. Determine mass of filled flask		
4. Determine weight of filled flask after $10 \pm 1$ min after removal of entrapped air completed		

**First Attempt:** Pass: \_\_\_\_\_ Fail: \_\_\_\_\_ **Second Attempt:** Pass: \_\_\_\_\_ Fail: \_\_\_\_\_

**Exam Administration:** Remote \_\_\_\_\_ In-Person \_\_\_\_\_

**Comments:**

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Examiner Name: \_\_\_\_\_ Examiner Signature: \_\_\_\_\_ Date: \_\_\_\_\_