WSDOT FOP for AASHTO T 309¹
Temperature of Freshly Mixed Portland Cement Concrete

1. Scope
   1.1 This test method covers the determination of temperature of freshly mixed Portland cement concrete.
   1.2 The values stated in English units are to be regarded separately as standard.
   1.3 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. Referenced Documents
   2.1 AASHTO Standards
       T 141 – Sampling Freshly Mixed Concrete
   2.2 ASTM Standards
       C 1721 – Practice for Sampling Freshly Mixed Concrete

3. Significance and Use
   3.1 This test method provides a means for measuring the temperature of freshly mixed concrete. It may be used to verify conformance to a specified requirement for temperature of concrete.
   3.2 Concrete containing aggregate of a nominal maximum size greater than 3 in (75 mm) may require up to 20 min for the transfer of heat from aggregate to mortar. (See ACI Committee 207.1R Report 3.)

4. Apparatus
   4.1 Container – Shall be made of nonabsorptive material and large enough to provide at least 3 in (75 mm) of concrete in all directions around the sensor of the temperature measuring device; concrete cover must also be at least three times the nominal maximum size of the coarse aggregate.
   4.2 Temperature Measuring Device – The temperature measuring device shall be capable of measuring the temperature of the freshly mixed concrete to ± 1°F (± 0.5°C) throughout the entire temperature range likely to be encountered in the fresh concrete. Liquid-in-glass thermometers having a range of 0 to 120°F (-18 to 49°C) are satisfactory. Other thermometers of the required accuracy, including the metal immersion type, are acceptable.
   4.3 Partial immersion liquid-in-glass thermometers (and possibly other types) shall have a permanent mark to which the device must be immersed without applying a correction factor.

¹This FOP is based on AASHTO T 309-11 and has been modified per WSDOT standards. To view the redline modifications, contact the WSDOT Quality Systems Manager at 360-709-5412.
5. Calibration of Temperature Measuring Device

5.1 Each temperature measuring device used for determining temperature of freshly mixed concrete shall be calibrated.

6. Sampling Concrete

6.1 The temperature of freshly mixed concrete may be measured in the transporting equipment provided the sensor of the temperature measuring device has at least 3 in (75 mm) of concrete cover in all directions around it.

6.2 Temperature of the freshly mixed concrete may be obtained following concrete placement using the forms as the container.

6.3 If the transporting equipment or placement forms are not used as the container, a sample shall be prepared as follows:

6.3.1 Immediately, prior to sampling the freshly mixed concrete, dampen (with water) the sample container.

6.3.2 Sample the freshly mixed concrete in accordance with Practice C 172, except that composite samples are not required if the only purpose for obtaining the sample is to determine temperature.

6.3.3 Place the freshly mixed concrete into the container.

7. Procedure

7.1 Place the temperature measuring device in the freshly mixed concrete so that the temperature sensing portion is submerged a minimum of 3 in (75 mm). Gently press the concrete around the temperature measuring device at the surface of the concrete so that ambient air temperature does not affect the reading.

7.2 Leave the temperature measuring device in the freshly mixed concrete for a minimum period of 2 min or until the temperature reading stabilizes, then read and record the temperature.

7.3 Complete the temperature measurement of the freshly mixed concrete within 5 min after obtaining the sample.

8. Report

8.1 Record the measured temperature of the freshly mixed concrete to the nearest 1°F (0.5°C).

8.2 Report results on concrete delivery ticket (i.e., Certificate of Compliance).

8.3 The name of the tester who performed the field acceptance test is required on concrete delivery tickets containing test results.

9. Precision and Bias

9.1 The precision and bias of this test method have not been determined. A precision and bias statement will be included when sufficient test data have been obtained and analyzed.
# Performance Exam Checklist

## Temperature of Freshly Mixed Concrete

**FOP for AASHTO T 309**

| Participant Name ________________________________ | Exam Date ____________________ |

<table>
<thead>
<tr>
<th>Procedure Element</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The tester has a copy of the current procedure on hand?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2. All equipment is functioning according to the test procedure, and if required,</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>has the current calibration/verification tags present?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Use calibrated thermometer approved for concrete:</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4. Place thermometer in sample with a minimum of 3 in (75 mm) cover around sensor?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>5. Gently press concrete around thermometer?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>6. Read temperature after a minimum of 2 minutes or when temperature</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>reading stabilizes? Complete temperature measurement within 5 minutes of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>obtaining sample?</td>
<td></td>
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</tr>
<tr>
<td>7. Record temperature to nearest 1°F (0.5°C)?</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

First Attempt: Pass ☐ Fail ☐  
Second Attempt: Pass ☐ Fail ☐

Signature of Examiner ________________________________

Comments: