

Bureau of Materials and Physical Research
 Illinois Modified AASHTO T 161-08, Procedure B
 Effective Date: May 1, 2010
 Revised Date: October 26, 2012

Standard Method of Test
 For
Resistance of Rapid Hardening Cement to Rapid Freezing and Thawing, Procedure B

Modifications apply only when testing material according to the Standard Specifications for road and Bridge Construction (January 1, 2012), Article 1001.01 (d)

| AASHTO Section | Illinois Modification |
|-----------------------|---|
| 2.1 | <p>Add as follows: AASHTO T 22 (Illinois Modified) Compressive Strength of Cylindrical concrete Specimens</p> <p>Revise as follows: AASHTO R 39 (Illinois Modified)</p> |
| 2.3 New Section | <p><i>Other Referenced Documents:</i> Portland Cement Concrete (BDE) Special Provision, Article 1020.04, Table 1, Class PP-4 Concrete, Note 9, and Article 1020.05 (b)(5).</p> |
| 3.5 New Section | <p>The Illinois Department of Transportation shall use only Procedure B when testing rapid hardening cement. All procedures/requirements not specifically dedicated to Procedure A shall also be applied when running Procedure B.</p> |
| 4.6 | <p>Delete the paragraph and replace with the following:</p> <p>Tempering Tank – with suitable provisions for maintaining the temperature of the test specimens in water, such that when removed from the tank and tested for fundamental transverse frequency the specimens will be within a temperature range of 23° ± 0.5° C (73° ± 1° F). The use of the specimen chamber in the freezing-and-thawing apparatus by stopping the apparatus at the end of the thawing cycle and holding the specimens in it shall not be considered as serving this requirement. A separate tank meeting the above requirements shall be provided.</p> |
| 7.1.1 New Section | <p><i>Rapid Hardening Cement</i>—Three sonic (ASTM C 215) beams and three 102 mm. (4 in.) diameter by 203 mm. (8 in.) height cylinder specimens (Illinois Modified AASHTO R 39) shall be made for testing this material.</p> |
| 7.3 | Delete the section. |
| 7.4 | Delete the section. |

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|-------------------------|---|----------------|------|------------------|---------------|---------------|------|--------|------------------|--------------------|------|-------------|----------|-------|---------------------------|
| 8.0.1 New Section | <p>Prepare a minimum 1.2 ft³ (0.03 m³) batch.</p> <p style="text-align: center;">Mix design for 1.0 yd³ (0.76 m³):</p> <table style="margin-left: auto; margin-right: auto;"> <tr><td>Fine Aggregate</td><td>FA 1</td></tr> <tr><td>Coarse Aggregate</td><td>CA 7 or CA 11</td></tr> <tr><td>Mortar Factor</td><td>0.93</td></tr> <tr><td>Cement</td><td>600 lbs (272 kg)</td></tr> <tr><td>Water/Cement Ratio</td><td>0.50</td></tr> <tr><td>Air content</td><td>4.0-6.0%</td></tr> <tr><td>Slump</td><td>2.00-6.00 in. (50-150 mm)</td></tr> </table> <p>The manufacturer should recommend Air-Entraining Admixture (AEA) dosage on lab stock AEA. AEA is the only admixture to be used unless the manufacturer states to use other admixtures and gives a dosage rate for them. Refer to Article 1020.05 (b)(5) in the Portland Cement Concrete (BDE) Special Provision.</p> <p>Put the aggregates into the mixer and start mixing. Introduce the water, leaving out enough water to rinse out each measure of admixture. Introduce the admixtures individually and mix thoroughly. Add cement and allow to mix for 4 minutes continuously. When mixing is complete, mold 3 sonic beam specimens for freeze-thaw and 3 cylinders for compressive strength. External vibration shall be used to consolidate specimens. Mold and cure specimens according to Illinois Modified AASHTO R 39. Cure the 3 cylinders for 24 hours and then test for compressive strength according to Illinois Modified AASHTO T 22. Cylinder results are for informational purposes only.</p> | Fine Aggregate | FA 1 | Coarse Aggregate | CA 7 or CA 11 | Mortar Factor | 0.93 | Cement | 600 lbs (272 kg) | Water/Cement Ratio | 0.50 | Air content | 4.0-6.0% | Slump | 2.00-6.00 in. (50-150 mm) |
| Fine Aggregate | FA 1 | | | | | | | | | | | | | | |
| Coarse Aggregate | CA 7 or CA 11 | | | | | | | | | | | | | | |
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| Slump | 2.00-6.00 in. (50-150 mm) | | | | | | | | | | | | | | |
| 8.2 | <p>Replace the first sentence with the following:</p> <p>Immediately after the specified curing period, bring the specimen to a temperature within 23° ± 0.5° C (73° ± 1° F) by placing them in the tempering tank and hold them for a sufficient time to ensure that the specimens are completely thawed throughout each specimen. Test for fundamental transverse frequency, determine the mass, and determine the average length and cross-sectional dimensions of the concrete specimens within the tolerance required in ASTM C 215.</p> | | | | | | | | | | | | | | |

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| | |
|--------|---|
| 8.3 | <p>Delete the paragraph and replace with the following:</p> <p>Start freezing and thawing tests by placing the specimens in the thawing water at the beginning of the thawing phase of the cycle. Remove the specimens from the apparatus, in a thawed condition, at intervals of approximately 50 cycles of exposure to the freezing-and-thawing cycles, test for fundamental transverse with the specimens at the temperature of $23^{\circ} \pm 0.5^{\circ} \text{ C}$ ($73^{\circ} \pm 1^{\circ} \text{ F}$), determine the mass of each specimen, and return them to the apparatus. To ensure that the specimens are completely thawed and at the specified temperature, place them in the tempering tank for a sufficient time for this condition to be attained throughout each specimen. Data have shown that 1.5 to 2 hours is sufficient to stabilize specimens in the tempering tank. Protect the specimens against loss of moisture while out of the apparatus and turn them end-for-end when returned. Return the specimens either to random positions in the apparatus or to positions according to some predetermined rotation scheme that will ensure that each specimen that continues under test for any length of time is subjected to conditions in all parts of the freezing apparatus. Continue each specimen in the test until it has been subjected to 100 cycles or until its relative dynamic modulus of elasticity reaches 60 percent of the initial modulus, whichever occurs first, unless other limits are specified (Note 5). Replace all failed beams with dummy beams.</p> |
| Note 6 | Delete the note. |
| 9.3 | Delete the section. |
| 10.2.1 | <p>Delete the paragraph and replace with the following:</p> <p>The ratio of water to cement.</p> |
| 10.2.2 | Delete the section. |
| 10.2.3 | Delete the section. |
| 10.2.4 | Delete the section. |
| 10.2.5 | Delete the section. |
| 10.2.6 | Delete the section. |
| 10.2.7 | Delete the section. |
| 10.4 | Delete the section. |
| 10.5.3 | Delete the section. |
| 10.6 | <p>Delete the section and replace with the following:</p> <p>Report values for the durability factor of each specimen, calculated to the nearest whole number and the number of cycles. Report values of loss or gain of mass for each specimen. Report any defects in each specimen which develop during testing, and the number of cycles at which such defects were noted.</p> |
| 11.2 | Delete the section. |