

**KTMR-22 RESISTANCE OF CONCRETE TO RAPID FREEZING AND THAWING**  
**(Kansas Test Method KTMR-22)**

KT-MR-22 follows the procedures set forth in ASTM C 666, Test Method for Resistance of Concrete to Rapid Freezing and Thawing (Procedure B), with the following exceptions:

Add 6.1.1

**6.1.1 Proportioning** – Design the concrete mixture to comply with the following.

25 %	-3/4" +1/2" (-19.0 mm + 12.5 mm) (SSD by towing)
25 %	-1/2" +3/8" (- 12.5 mm + 9.5 mm) (SSD by towing)
50 %	FA-A (correction made for moisture) (from Kansas River in Shawnee County)
Y.C.F.	602 lbs/yd <sup>3</sup> (357 kg/m <sup>3</sup> )
w / c	0.40 (tap water) (Type I/II cement)
Air	5 to 7 % (using air entraining agent)

The total volume of concrete required for testing is approximately 0.75 ft<sup>3</sup> (0.021 m<sup>3</sup>).

Delete 7.4 and add:

**7.4** For this test the specimens shall be cured for 90 days as follows:

**7.4.1** As soon as possible after molding, transfer the specimens to an ASTM C511 “moist room” until they reach 67 days of age.

**7.4.2** Transfer the specimens to an ASTM C511 “cement mixing room”, until they reach 88 days of age.

**7.4.3** Submerge beams in tap water maintained between 60°F to 80°F (15.6°C to 26.7°C) for 24 hours.

**7.4.4** Submerge beams in tap water maintained at 40°F (4.4°C) maximum for 24 hours. (Typically accomplished by adding ice to the tank used for step 7.4.3. Enough ice should be added so that a substantial quantity of ice remains in the bath after 24 hours.)

Delete 8.1

Delete 8.3 and add:

8.3 Remove the specimens from the soaking tank in 7.4.4 and determine fundamental transverse frequency, mass, and length of the specimens while inside the temperature range specified for the tempering tank in 4.6. Determine these measurements at intervals not to exceed 56 cycles of freezing-and-thawing. To ensure that the specimens are completely thawed and at the specified temperature place them in the tempering tank or hold them at the end of the thaw cycle in the freezing-and-thawing apparatus for a sufficient time for this condition to be attained throughout each specimen to be tested. 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 at least 660 cycles, its relative dynamic modulus of elasticity reaches 60 % of the initial modulus, or its expansion reaches or exceeds 0.10 %, whichever occurs first. Whenever a specimen is removed because of failure, replace it for the remainder of the test by a dummy specimen. Each time the specimen is tested for fundamental frequency (Note 6) and length change, make a note of its visual appearance and make special comment on any defects that develop (Note 7). When it is anticipated that specimens may deteriorate rapidly, they should be tested for fundamental transverse frequency and length change (optional) at more frequent intervals.

Note: Method of determining resonant frequency of the concrete specimen is per ASTM C 215, section 9.1, impact resonance, transverse mode with the following exceptions: The specimen beam is placed on an isolation pad of medium density expanded polystyrene, approximately 2-inches (50 mm) thick. The accelerometer is located on the top surface of the beam, approximately 1-inch (25 mm) from one end, and the point of impact is approximately 1-inch (25 mm) from the opposite end of this top surface; the impact and accelerometer locations are marked from the outset of the test for repeatability purposes.