Tex-704-I, Making, Curing, and Testing Compression Test Specimens for Precast Concrete

Contents:

Section 1

Overview

Effective Dates: August 2000–February 2008.

This method outlines the procedure for making, curing, and testing concrete cylinders at plants that fabricate precast prestressed and non-stressed concrete products by the wet-cast method. The making, curing, and testing of concrete cylinders by the dry-cast method shall be according to the pertinent specification.

Units of Measurement

The values given in parentheses (if provided) are not standard and may not be exact mathematical conversions. Use each system of units separately. Combining values from the two systems may result in nonconformance with the standard.

Section 2

Definitions

The following terms and definitions are referenced in this test method:

- prestressed concrete - Prestressed concrete is precast concrete subject to pretensioning, post-tensioning, or a combination of both.
- non-stressed concrete. - Non-stressed concrete is precast concrete not subjected to pretensioning or post-tensioning.

Section 3

Strength Test Cylinder Information

Make Release of Tension Strength Cylinders when the pretensioning method is used. These cylinders are used to determine when the concrete strength is adequate to apply the prestressing force.

Make Partial Tensioning Strength Cylinders when a partial tensioning force is required to remove the member from the casting bed. This force may be applied either by the pretensioning or the post-tensioning method, whichever is specified. These cylinders are used to determine when the concrete strength is adequate to apply the partial tensioning force.

Make Tensioning Strength Cylinders when the post-tensioning method is used. These cylinders are used to determine when the concrete strength is adequate to apply the final prestressing force by the post-tensioning method.

Make Handling Strength Cylinders when a minimum concrete compressive strength is required to remove non-stressed concrete members from the casting forms.

Make Design Strength Cylinders for precast concrete products to determine if design strength requirements have been attained.

Section 4

Apparatus

The apparatus required for making, curing, and testing concrete test cylinders shall be as stated in test methods "Tex-418-A, Compressive Strength of Cylindrical Concrete Specimens, Tex-447-A, Making and Curing Concrete Test Specimens;" and "Tex-450-A, Capping Cylindrical Concrete Specimens."

Section 5

Procedures

Cylinder Making

Sample concrete according to Test Method "Tex-407-A, Sampling Freshly Mixed Concrete."

Mold test cylinders according to "Tex-447-A, Making and Curing Concrete Test Specimens." After molding, inscribe the cylinder identification into the top of the cylinders with minimal disturbance to the surface finish, or tag each cylinder using an approved tagging system. Place cover plates or caps over the molds to prevent moisture loss.

- Prestressed Concrete – Release of Tension Cylinders, Partial Tensioning Cylinders, Tensioning Cylinders, and Design Strength Cylinders
  - A minimum of six companion cylinders shall be made for each strength test for each continuous concrete casting, separate stressing line, and curing condition. The cylinders may represent more than one stressing line if the total volume of concrete does not exceed 76 m^3 (100 yd^3).
  - The sample may be taken from any batch of the concrete to be represented.
- Non-Stressed Concrete – Handling Strength and Design Strength Cylinders
  - Six companion cylinders shall be made for each strength test for each 76 m^3 (100 yd^3) production lot, or fraction thereof, for each casting day.

Cylinder Curing

The cylinder curing procedure for prestressed concrete is different than the one for non-stressed concrete.

- Prestressed Concrete
  - Cure Release of Tension Cylinders, Partial Tensioning Cylinders, and Tensioning Cylinders in a manner identical to, and along with, the members they represent. Release of Tension Cylinders may be cured, as an option, according to Test Method "Tex-715-I, Curing Release of Tension Strength Cylinders for Precast Prestressed Concrete Products Using Match-Cure Technology." If post-tensioned members are partially tensioned and removed from the casting bed to a curing area, then move the tensioning cylinders to that area and cure in the same manner. If curing requirements of the members are completed prior to final tensioning, curing of the tensioning cylinders shall also cease at this point.
  - Cure Design Strength Cylinders in a manner identical to, and along with, the members they represent until release of tension or partial tensioning strength is obtained. At this time, visibly inspect the cylinders for damage or molding imperfections. Place acceptable cylinders in a curing tank and cure, according to

Test Method "Tex-447-A, Making and Curing Concrete Test Specimens," until the designated testing time.

- Non-stressed Concrete
  - Cure Handling Strength Cylinders in a manner identical to, and along with, the members they represent.
  - Cure Design Strength Cylinders in a manner identical to, and along with, the members they represent for approximately 24 hours. At this time, visibly inspect the cylinders for damage or molding imperfections. Place acceptable cylinders in a curing tank and cure, according to Test Method "Tex-447-A, Making and Curing Concrete Test Specimens," until the designated testing time.

Cylinder Testing

Test all cylinders according to Test Method "Tex-418-A, Compressive Strength of Cylindrical Concrete Specimens."

- Prestressed Concrete
  - Plant personnel shall test Release of Tension Cylinders, Partial Tensioning Cylinders, and Tensioning Cylinders on the field laboratory's compression testing machine while witnessed by the Inspector. Report the average strength of two consecutively tested cylinders, which meets or exceeds the minimum required strength, as the official concrete strength.
  - Plant personnel shall test Design Strength Cylinders on the field laboratory's compression testing machine while witnessed by the Inspector. When the anticipated strength exceeds the capacity of the field laboratory compression testing machine, then the cylinders shall be tested by an approved commercial laboratory. Test the first three cylinders consecutively at a minimum age of seven days and report the average strength as the official concrete strength. Should the average strength of the first three cylinders fail to meet design strength requirements, ship the last three cylinders to CSTM for 28-day design strength testing. If shipment is necessary, wrap the cylinders in wet paper or curing mats and seal in a plastic bag prior to shipment.
- Non-stressed Concrete
  - Plant personnel shall test Handling Strength and Design Strength Cylinders on the field laboratory's compression testing machine while witnessed by the Inspector. The cylinders may also be tested by an approved commercial laboratory. Report the average strength of two consecutively tested cylinders, which meets or exceeds the minimum required handling or design strength, as the official concrete strength.
  - When testing Design Strength Cylinders**,** if design strength requirements are not met with the first four cylinders, then test the remaining two cylinders on the field laboratory's compression testing machine or by an approved commercial laboratory at the age of 28 days.

Section 6

Archived Versions

Archived versions of Test Method "Tex-704-I, Making, Curing, and Testing Compression Test Specimens for Precast Concrete" are available through the following links:

- Click on 704-0899 for the test procedure effective August 1999 through July 2000.