

GDT 35

A. Scope

For a complete list of GDTs, see the Table of Contents.

Use this test method to make and cure compression and flexure test specimens of concrete sampled from concrete being used in construction.

B. Apparatus

The apparatus consists of the following:

1. **Cylindrical Mold:** Use a cylindrical mold made of non-absorbent material that is substantial enough to hold its form during the molding of test specimens.

Molds must not vary from the standard diameter by more than 1/16 in (1.18 mm) or from the standard length by more than 1/4 in (6 mm). Oil reusable molds before use. Single-use molds (WM-10) need not be oiled. All molds must be watertight when assembled for use.

You can use molds made from the following materials:

- Cold-drawn, seamless steel tubing; or steel pipe machined on the inside (cut the tubular sections to the proper length, split along the element, and fit it with circumferential metal bands and bolts to close.)
- Iron or steel castings
- Standard plastic or cardboard molds manufactured for concrete specimens

NOTE: Do not use molds of formed sheet metal.
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2. **Base Plates:** Use steel plates that do not allow leakage for all reusable molds.
3. **Scoop:** Use a standard scoop.
4. **Trowel:** Use a standard brick mason's type.
5. **Tamping Rod:**
 - For 6" X 12" Cylinders: Use a 5/8 in (16 mm) round metal rod, approximately 24 in (600 mm) long with one end rounded to a hemispherical tip with a 5/8 in (16 mm) diameter.
 - For 4" X 8" Cylinders: Use a 3/8 in (10 mm) round metal rod, approximately 12 in (300 mm) long with one end rounded to a hemispherical tip with a 3/8 in (10 mm) diameter.
6. **Beam Mold:** Use molds for flexure test specimens that are rigid, non-absorbent, watertight, and at least 20 in (500 mm) long.
7. **Vibrator (Flexural Test):** Use an internal vibrator that has a rigid shaft or flexible shaft powered by electric motor. The frequency of vibration must be 7,000 revolutions per minute or greater. The outside diameter of the vibrating element must be at least 0.75 in (19 mm) and at most 1.5 in (37.5 mm). The shaft must be at least 24 in (600 mm) long.

C. Sample Size and Preparation

Obtain the sample of freshly mixed concrete according to GSP 17, or the method for sampling and testing Portland cement concrete pavement (see Sampling Requirements for Section 430), whichever is applicable.

When 6" X 12" cylinders are fabricated, a "set" will consist of two cylinders. When 4" X 8" cylinders are fabricated, a set will consist of three cylinders.

D. Procedures

1. **Compression Test Specimens**
 - a. Use cylindrical compression test specimens with a length equal to twice the diameter. Use standard cylindrical specimens that are 6 in (150 mm) in diameter by 12 in (300 mm) long. (4" X 8" Cylinders may be used for nonstructural concrete when directed by the State Materials Engineer)
 - b. Mold specimens promptly on a level, rigid, horizontal surface, free from vibration and other disturbances. Try to mold the specimens close to where they will be stored during the first 24 hours.

- c. If you cannot mold the specimens where they will be stored, move them to storage immediately after striking off the excess concrete.

NOTE: To move cardboard molds, use a trowel under the mold to prevent specimen distortion.

- d. Avoid jarring, striking, tilting, or scarring the surface of the specimens when moving them to a safe place.
- e. Form the test specimens by placing the concrete in the mold in three layers of approximately equal volume for 6" X-12" specimens and two equal layers for 4" X 8" specimens.
- f. While adding concrete to the mold, move each scoop full around the top edge of the mold to ensure a symmetrical distribution of the concrete within the mold.
- g. Distribute the concrete further with a circular motion of the tamping rod.
- h. Rod each layer with 25 strokes of the tamping rod. Distribute the strokes uniformly over the cross-section of the mold.
Rod the bottom layer throughout its depth. Make sure the rod penetrates the subsequent layers and the underlying layer.
- i. Tap the size of the mold to close voids left by the tamping rod.
- j. After rodding the top layer, strike off the excess concrete to the level of the mold with a trowel.
- k. Immediately after molding, cover the specimens with three plies of wet burlap, plastic bags, or glass or metal plates to prevent evaporation.
- l. If using the standard plastic mold, cover with the standard sealing lid to prevent evaporation.
- m. After molding, store the specimens between 60 ° and 80 °F (16 ° to 27 °C) for the first 24 hours and remove from casting site within 3 days.
 - 1) With the standard plastic molds, set the curing temperature at 70 ° to 76 °F (21 ° to 24 °C).
 - 2) Use heating elements in curing tanks from November through April to maintain the proper temperature.
- n. After 24 hours, remove the test specimens from the molds.

NOTE: If using standard plastic molds, do not remove the specimen from the mold.

For test specimens used to determine when a structure shall be put into service, protect them from the elements with the same materials you protect the structures they represent.

- o. Store the test specimens in a curing tank or other temperature controlled facility until you ship them to the laboratory for testing.
 - p. For the 28-day test, send the specimens to the Laboratory so they arrive not more than seven days prior to the testing time. Carefully prevent damage to specimens in transit to the Laboratory.
 - q. For other test periods, keep the specimens in the field for at least 3/4 of the test period.
2. Flexure Test Specimens
- a. The cross-section of the flexure test specimen is 6 x 6 in (150 x 150 mm). The length is at least 20 in (500 mm).
 - b. Overfill the mold with one lift of concrete with a scoop or shovel. Symmetrically distribute the concrete within the mold to minimize segregation.
 - c. Consolidate the concrete with internal vibration for the time required to achieve proper consolidation, based on the type of concrete.

NOTE: Too much vibration may cause segregation.

- 1) Observe a standard duration for the particular kind of concrete, vibrator, and specimen involved. The time required will depend on the workability of the concrete and the effectiveness of the vibrator.
- 2) Be sure to withdraw the vibrator so that no air pockets are left in the specimen.
- 3) Vibration is sufficient when the surface of the concrete appears relatively smooth.
- d. Insert the vibrator at three intervals along the longitudinal centerline of the specimen. Do not strike the bottom or sides of the mold.
 - 1) Insert the vibrator first at the center of the specimen, and then at the quarter points.

- 2) After vibrating the concrete, spade the specimen along the sides and ends with a trowel or other suitable tool.
- 3) Tap the sides of the mold to close the voids.
- e. For test specimens made to check the adequacy of the laboratory design for strength of the concrete:
 - 1) Cover the specimen immediately after molding with a double layer of wet burlap.
 - 2) Keep the specimen wet until you remove it from the mold or cover it with an impervious curing blanket.
 - 3) During the first 24 hours, cover with three plies of wet burlap, plastic bags, or glass or metal plates to prevent evaporation.
 - 4) After the 24-hour period, remove the specimens from the molds.
 - 5) Store the specimens until the time of test in a curing tank at 70 ° to 76 °F (21° to 24 °C).
- f. For test specimens used to determine when a structure or pavement slab may be put into service:
 - 1) Cure for 24 hours as nearly as practicable in the same manner as the concrete in the structure or pavement slab.
 - 2) After 24 hours, take the specimens in the molds to a location preferably near a field laboratory.
 - 3) Remove the specimens from the molds.
 - 4) Store the specimens on the ground as molded, with the top surfaces up.
 - 5) Bank the sides and ends of the specimen with damp earth or sand, leaving the top surfaces exposed to the specified curing treatment.
 - 6) Keep the earth or sand damp with water.
 - 7) At the end of the curing period, leave the specimens in-place with the top surfaces exposed to the weather in the same manner as the structure.
 - 8) In lieu of storing the specimens with the top surfaces exposed, cure the specimens in a moist curing tank at a temperature of 70 ° to 76 ° F (21° to 24 °C).
 - 9) Test the specimens in the moist condition resulting from the specified curing treatment.

E. Calculations

No calculations are required.

F. Report

Include all pertinent information about the concrete on the form sent with the cylinders for testing at the laboratory. Include:

1. Date and time the samples were first made
2. Site name
3. Where at the site the samples were taken
4. Cement Contractor (and corresponding Qualified Products List number)
5. Number of samples
6. Your (the Inspector's) name and signature