State of Nevada
Department of Transportation
Materials Division

METHOD OF TEST FOR MAKING AND CURING CONCRETE COMPRESSION TEST SPECIMENS IN THE FIELD

SCOPE

This test method covers the procedures for making and curing concrete compression test cylinders in the field.

APPARATUS

1. Cylindrical molds, with non-absorbent surfaces, substantial enough to hold their shape during the molding of test specimens. The approved standard mold is 100 mm x 200 mm (4 in. x 8 in.). When the nominal maximum size of the coarse aggregate exceeds 25 mm (1 in.), use 150 mm x 300 mm (6 in. x 12 in.) molds.

   The nominal maximum size is the smallest sieve opening through which the entire amount of aggregate passes.

2. Tamping rods, round, straight steel rod with the dimensions listed below. Having the tamping end or both ends rounded to a hemispherical tip of the same diameter as the rod.

   Tamping Rod Requirements:

Diameter of cylinder	Rod Dimensions	
	Diameter: ± 2 mm 1/16 in.	Length: ± 100 mm (4 in.)
100 mm (4 in.)	10 mm (3/8 in.)	300 mm (12 in.)
150 mm (6 in.)	16 mm (5/8 in.)	600 mm (24 in.)

3. Internal vibrators, with rigid or flexible shafts. The vibrator frequency shall be at least 7000 vibrations per minute while the vibrator is operating in the concrete. The diameter of the vibrator shall be no more than one-third the diameter of the cylinder mold and the combined length of the vibrator shaft and vibrating element shall exceed the depth of the section being vibrated by at least 75 mm (3 in.).

4. Mallet, with a rubber or rawhide head weighing 0.60 ± 0.02 kg (1.25 ± 0.50 lb).

5. Shovel, pails, trowel, scoop, etc.

6. Suitable pan, wheelbarrow or nonabsorbent mixing board of sufficient capacity to allow mixing of the entire sample.

SAMPLING

Obtain a representative sample per Test Method Nev. T425. The item being constructed shall be noted on NDOT form 020-017.

PROCEDURE

1. Begin the concrete cylinders within 15 minutes of obtaining the representative sample.

2. Specimens shall be molded on a level, rigid surface, free of vibration or other disturbances at a place as close as practicable to the location where they are to be stored. If it is not practicable to mold the specimens where they will be stored, they may be moved to the place of storage immediately after being struck off. All jarring, striking, tilting, or scarring the surface of the completed specimens shall be avoided when moving them to the storage area.

2. In 150 mm (6 in.) diameter molds, the concrete shall be placed, using a scoop, in three layers of approximately equal volume. In 100 mm (4 in.) diameter molds, the concrete shall be placed, using a scoop, in two layers of approximately equal volume. In placing each portion of concrete, the scoop or trowel shall be moved around the top edge of the mold as the concrete slides from it, in order to ensure a symmetrical distribution of the concrete and to minimize segregation of the coarse aggregate within the mold.

3. Preparation of satisfactory specimens may require different methods of consolidation. The methods of consolidation are rodding and internal vibration. Base the selection of the method of consolidation on the slump, unless the method is stated in the specifications under which the work is being performed. Rod concrete with a slump greater than 75 mm (3 in.). Rod or vibrate concrete with slump of 25 to 75 mm (1 to 3 in.). Vibrate concrete with a slump of less than 25 mm (1 in.).

   Rodding. Mold and rod in accordance with Table 1. Each layer shall be rodded 25 times. The strokes shall be distributed uniformly over the cross section of the mold. In rodding the first layer use sufficient force to penetrate the entire depth without denting or cracking the bottom of the mold. Each successive layer should be rodded enough to penetrate about 25 mm (1 in.) into the underlying layer. After each layer is rodded, tap the outside of the mold lightly 10 to 15 times with the mallet to close any holes left by rodding and to release any large air bubbles that may have been trapped. Avoid overfilling by more the 6 mm (0.25 in.) when adding the final layer.

Table 1
Molding Requirements by Rodding:

Diameter of Cylinder	Number of Layers	Number of Rods per Layer	Approx. Depth of Layer
100 mm (4 in.)	2	25	½ depth of specimen
150 mm (6 in.)	3	25	⅓ depth of specimen

Vibration. Mold and vibrate in accordance with Table 2. Place all the concrete, for each layer, in the mold before starting vibration of that layer. Allow the vibrator to penetrate through the layer being vibrated, and into the layer below, approximately 25 mm (1 in.). The vibrator shall not be allowed to rest on or touch the bottom or sides of the mold. Carefully withdraw the vibrator in such a manner as to avoid air pockets being left in the specimen. After vibration of each layer, tap the sides of the mold 10 to 15 times with a mallet to ensure removal of large entrapped air bubbles at the surface of the mold. When adding the final layer, avoid overfilling by more than 6 mm (0.25 in.). The duration of vibration required will depend upon the work ability of the concrete and the effectiveness of the vibrator. In most cases, sufficient vibration has been applied as soon as the surface of the concrete has become relatively smooth. Continue vibration only long enough to achieve proper consolidation of the concrete. Over vibration may cause segregation.

Table 2
Molding Requirements by Vibration:

Diameter of Cylinder	Number of Layers	Number of Vibrator Insertions per Layer	Approx. Depth of Layer
100 mm (4 in.)	2	1	½ depth of specimen
150 mm (6 in.)	3	2	⅓ depth of specimen

4. Striking off and covering. After consolidation, the surface of the concrete shall be struck off, without undue manipulation, using a wood float, trowel or the tamping rod where the consistency of the concrete permits. All completed specimens shall be covered immediately using the lid provided with the mold, to prevent loss of moisture, seal the lid with duct tape. On the mold lid write the contract number, cylinder set number, quantity of cylinders (Ex. 1 of 5), mix design number and date.

CURING SPECIMENS

Method A: Standard Curing (Specimens for determining compliance with ultimate strength specifications):

During the first 48 hours of initial curing and after molding, store all test specimens in the same location under the same conditions that maintain the temperature immediately adjacent to the specimens in the range of 16°C to 27°C (60°F to 80°F) and prevent loss of moisture from the specimens. Storage temperatures may be regulated by means of ventilation or by evaporation of water from sand or burlap (temperature within damp sand and under wet burlap or similar materials will always be lower than the temperature in the surrounding atmosphere if evaporation takes place), or by using heating devices such as stoves, electric light bulbs, or thermostatically controlled heating cables. A temperature record of

the specimens shall be established by means of maximum-minimum thermometer, record the high and low temperature on NDOT form 020-017 under remarks. Store specimens in tightly constructed, insulated, firmly braced wooden boxes, damp sand pits, temporary buildings at construction sites, under wet burlap in favorable weather, or in heavyweight closed plastic bags, or use other suitable methods, provided the foregoing requirements limiting specimen temperature and moisture loss are met. Remove specimens from storage and ship directly to the concrete laboratory as soon as possible after the initial field storage of 48 hours.

Method B : Field Curing (Specimens for determining the earliest date a structure may be put into service):

After the initial 24-hour storage period per Method A, the specimens shall be placed in or on the structure as near to the point of sampling as possible, and shall receive, insofar as practicable, the same protection from the elements as is given to the portion(s) of the structure which they represent for another 24 hours. In simulating these conditions, the test specimens are relatively small and therefore more quickly affected by freezing or drying conditions than the much larger volume of concrete in the structure. The specimens must also be protected from injury while on the worksite. A temperature record of the specimens shall be established by means of maximum-minimum thermometer, record the high and low temperature on NDOT form 020-017 under remarks. These specimens are presumed to show the compressive strength of the portion(s) of the structure they represent at a given time and under field curing conditions. Therefore, such specimens should be kept in the field as long as possible, preferable right up to a day or two before being tested. Remove specimens from the field and ship directly to the concrete laboratory after 48 hour storage period and in time for necessary testing as specified.