

METHODS OF SAMPLING AND TESTING
MT 105-04
METHOD OF SAMPLING FRESH CONCRETE
(Modified AASHTO T 141)

1 Scope:

- 1.1** This method describes the procedures for obtaining representative samples of fresh concrete as delivered to the project site and on which tests are to be performed to determine compliance with quality requirements of the specifications under which the concrete is furnished (Note 1). The method includes sampling from stationary, paving and truck mixers, and from agitating and non-agitating equipment used to transport central mixed concrete.

Note 1 - Composite samples are required by this method, unless specifically excepted by procedures governing the tests to be performed such as tests to determine uniformity of consistency and mixer efficiency. Procedures used to select the specific test batches are not described in this method, but it is recommended that random sampling be used to determine overall specification compliance.

- 1.2** This method also covers the procedures to be used for preparing a sample of concrete for further testing where it is desirable or necessary to remove the aggregate larger than a designated size. This removal of larger aggregate particles is preferably accomplished by wet-sieving. (See paragraph 5.4.)

2 Referenced Documents:

2.1 AASHTO Standards:

T 119 Slump of Portland Cement Concrete
T 121 Weight Per Cubic Foot, Yield, and Air Content (Gravimetric) of Concrete

MT Manual:

MT-405 Wire Cloth Sieves for Testing Purposes

3 Sampling:

- 3.1** The elapsed time between obtaining the first and final portions of the composite samples shall be as short as possible, but in no instance shall it exceed 15 min.
- 3.1.1** Transport the individual samples to the place where fresh concrete tests are to be performed or where test specimens are to be molded. They shall then be combined and remixed with a shovel the minimum amount necessary to ensure uniformity and compliance with the minimum time limits specified in Section 3.1.2.
- 3.1.2** Start tests for slump or air content, or both, within 5 min. after obtaining the final portion of the composite sample. Complete these tests as expeditiously as possible. Start molding specimens for strength tests within 15 min. after fabricating the composite sample. Keep the elapsed time between obtaining and using the sample as short as possible and protect the sample from the sun, wind, and other sources of rapid evaporation, and from contamination.

4 Procedure:

- 4.1** *Size of Sample*--Make the samples to be used for strength tests a minimum of 1 ft³ (28 liters). Smaller samples may be permitted for routine air content and slump tests and the size shall be dictated by the maximum aggregate size.

4 Procedure: (continued)

- 4.2** The procedures used in sampling shall include the use of every precaution that will assist in obtaining samples that are truly representative of the nature and condition of concrete sampled as follows:

Note 2 - Sampling should normally be performed as the concrete is delivered from the mixer to the conveying vehicle used to transport the concrete to the forms; however, specifications may require other points of sampling, such as at the discharge of a concrete pump.

Note 3 - As routine air content and slump tests are not readily adaptable to sampling the concrete at two or more regularly spaced intervals during discharge of the middle portion of the batch as specified in this method, the sample for air content, slump, and temperature may be taken after at least one-quarter cubic yard of concrete has been discharged.

- 4.2.1** *Sampling from Stationary Mixers, Except Paving Mixers*--Sample the concrete at two or more regularly spaced intervals during discharge of middle portion of the batch. Take the samples within the time limit specified in Section 3, and composite them into one sample for test purposes. Do not obtain samples from the very first or last portions of the batch discharge. Perform sampling by passing a receptacle completely through the discharge stream, or by completely diverting the discharge into a sample container. If discharge of the concrete is too rapid to divert the complete discharge stream, discharge the concrete into a container or transportation unit sufficiently large to accommodate the entire batch and then accomplish the sampling in the same manner as given above. Take care not to restrict the flow of concrete from the mixer, container, or transportation unit so as to cause segregation. These requirements apply to both tilting and non-tilting mixers.

- 4.2.2** *Sampling from Paving Mixers*--Sample the concrete after the contents of the paving mixer have been discharged. Obtain samples from at least five different portions of the pile and then composite into one sample for test purposes. Avoid contamination with subgrade material or prolonged contact with an absorptive subgrade. To preclude contamination or absorption by the subgrade, sample the concrete by placing three shallow containers on the subgrade and discharging the concrete across the containers. Composite the samples so obtained into one sample for test purposes. The containers shall be of a size sufficient to provide a composite sample size that is in agreement with the maximum aggregate size.

Note 4 -In some instances, the containers may have to be supported above the subgrade to prevent displacement during discharge.

- 4.2.3** *Sampling from Revolving Drum Truck Mixers or Agitators*--Sample the concrete at two or more regularly spaced intervals during discharge of the middle portion of the batch. Take the samples within the time limit specified in Section 3 and composite them into one sample for test purposes. In any case do not obtain samples until after all of the water has been added to the mixer; also do not obtain samples from the very first or last portions of the batch discharge. Sample by repeatedly passing a receptacle through the entire discharge stream or by completely diverting the discharge into a sample container. Regulate the rate of discharge of the batch by the rate of revolution of the drum and not by the size of the gate opening.

- 4.2.4** *Sampling from Open-Top Truck Mixers, Agitators, Non-agitating equipment, or Other Types of Open-Top Containers*--Take samples by whichever of the procedures described in 4.2.1, 4.2.2, or 4.2.3 is most applicable under the given conditions

5 Additional Procedure for Large Maximum Size Aggregate Concrete:

- 5.1** When the concrete contains aggregate larger than that appropriate for the size of the molds or equipment to be used, wet-sieve the sample as described below except make unit-weight tests for use in yield computations on the full mix.

5 Additional Procedure for Large Maximum Size Aggregate Concrete: (continued)

Note 5 - The effect of wet-sieving the test results should be considered. For example, wet-sieving concrete causes the loss of a small amount of air due to additional handling. The air content of the wet-sieved fraction of concrete is greater than that of the total concrete because the larger size aggregate, which is removed, does not contain air. The apparent strength of wet-sieved concrete in smaller specimens is usually greater than that of the total concrete in larger appropriate size specimens. The effect of these differences may need to be considered or determined by supplementary testing for quality control or test result evaluation purposes.

5.2 Definition:

5.2.1 *Wet-Sieving Concrete* - The process of removing aggregate larger than a designated size from the fresh concrete by sieving it on a sieve of the designated size.

5.3 Apparatus:

5.3.1 *Sieves* - as designated, conforming to MT-405, Wire-Cloth Sieves for Testing Purposes.

5.3.2 *Wet-Sieving Equipment* - Equipment for wet-sieving concrete shall be a sieve as noted in 5.3.1 of suitable size and conveniently arranged and supported so that one can shake it rapidly by either hand or mechanical means. Generally, a horizontal back and forth motion is preferred. The equipment shall be capable of rapidly and effectively removing the designated size of aggregate.

5.3.3 *Hand Tools* - Shovels, hand scoops, plastering trowels, and rubber gloves as required.

5.4 Procedure:

5.4.1 *Wet-Sieving* - After sampling the concrete, pass the concrete over the designated sieve and remove and discard the aggregate retained. This shall be done before remixing. Shake or vibrate the sieve by hand or mechanical means until no undersize material remains on the sieve. Mortar adhering to the aggregate retained on the sieve shall not be wiped from it before it is discarded. Place only enough concrete on the sieve at any one time so that after sieving, the thickness of the layer of retained aggregate is not more than one particle thick. The concrete which passes the sieve shall fall into a batch pan of suitable size which has been dampened before use or onto a clean, moist, nonabsorbent surface. Scrape any mortar adhering to the sides of the wet-sieving equipment into the batch. After removing the larger aggregate particles by wet-sieving, remix the batch with a shovel the minimum amount necessary to ensure uniformity and proceed testing immediately.