

BELL SYSTEM PRACTICES
Outside Plant Construction
and Maintenance

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CONCRETE AND MORTAR
TESTS

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1. GENERAL

1.01 The tests described in this section are used for checking various characteristics of concrete aggregates and concrete. The inspector or supervisor will determine when these tests are to be made.

2. SEDIMENTATION TEST

2.01 The sedimentation test is used to determine the approximate quantity of clay and silt in sand.

2.02 A 32-ounce graduated prescription bottle shall be filled to the 14-ounce mark with the sand to be tested and clear water added to the 28-ounce mark.

2.03 This mixture is then shaken vigorously and the contents allowed to settle for one hour. If at the end of this period more than an ounce of sediment, as measured by the graduations on the bottle, appears above the aggregate, the sand should be rejected.

3. COLOR TEST FOR ORGANIC IMPURITIES IN SAND

3.01 The color test is an approximate method for determining the presence of injurious organic impurities in sand.

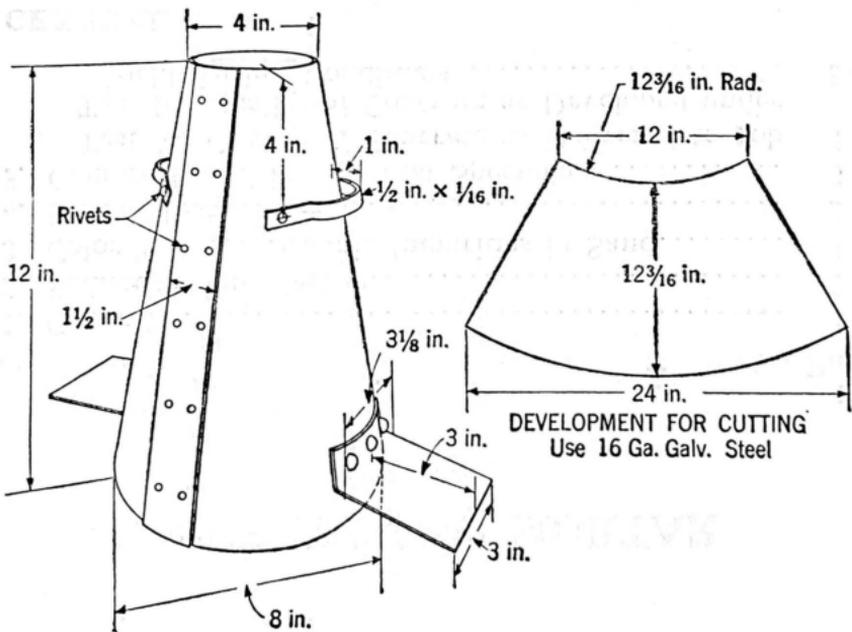
3.02 Fill a 12-ounce graduated medicine bottle to the 4-1/2-ounce mark with the sand to be tested. Add a 3 per cent. solution by weight of sodium hydroxide (caustic soda) obtainable at any drug store, until the volume of the sand and liquid after shaking vigorously is 7 ounces.

3.03 Allow the bottle to stand for 24 hours. If, after standing for 24 hours, the clear liquid above the sand is colorless or of a light yellow or straw color the sand may be considered satisfactory as regards organic impurities. If the liquid is darker than a straw color the sand should not be used.

4. SLUMP TEST

4.01 The slump test is used for determining consistency of concrete by measuring the depth to which a mass of concrete of given size and shape will subside after the support is removed.

4.02 The test requires the use of a mold in the form of a frustum of a cone with an open base 8 inches in diameter, an open top 4 inches in diameter, a height of 12 inches and provided with foot pieces and handles.



4.03 To make the test, first dampen the mold, then place it with base down on a flat, moist, non-absorbent surface. Hold the mold firmly in place by standing on the foot pieces while the mold is being filled. Fill the mold in three successive layers, each approximately one-third the volume of the mold (approximate depths from the tops of successive layers to the bottom of the mold—2-1/2, 6 and 12 inches). In depositing each layer, the concrete shall be so spread around the interior of the mold as to ensure symmetrical distribution of the material. Each layer in turn shall be rodded with 25 strokes of a 5/8 inch rod, 24 inches in length, bullet pointed at the lower end. The strokes shall be distributed in a uniform manner over the cross-section of the mold and shall just penetrate into the underlying layer. The bottom layer shall be rodded throughout its depth. After the top layer has been rodded, the surface of the concrete shall be struck off so that the mold is exactly filled.

4.04 Remove the mold by raising it vertically by the handles as soon as it is filled and allow the molded concrete to subside until flow has ceased. Measure the height of the resultant mass. This height subtracted from 12, the height of the mold, gives the slump of the concrete being tested. For example, if the height of the mass of concrete after the concrete has subsided is 9 inches, the slump of that concrete would be 12 inches minus 9 inches or 3 inches. Slump specimens which break or slough off laterally should be remade because they would give incorrect results.

4.05 After the slump measurement is made, an indication of the plasticity of the mix can be obtained by tapping the side of the mass of concrete gently with the tamping rod and observing the behavior of the concrete. A well proportioned, workable mix will continue to slump gradually without segregating, while a poor mix will crumble, segregate and fall apart.

5. COMPRESSION STRENGTH TEST SPECIMENS

5.01 The compression strength test is used to determine the resistance of concrete to crushing as measured in pounds per square inch of area. The test is made in a laboratory equipped for testing specimens prepared in the field from samples of the concrete used on the job.

5.02 The test specimens shall be cylindrical in form with the length 12 inches and the diameter 6 inches. The molds shall be made of non-absorbent material and shall be substantial enough to hold their form during the molding of the test specimens. They shall not vary in diameter more than 1/16 inch in any direction, nor shall they vary in height more than 1/16 inch from the height specified. They shall be substantially water-tight so that there will be no leakage of water

from the test specimen during molding. Paraffined cardboard molds will give good results with careful handling.

5.03 Each mold shall be provided with a base plate having a smooth plane surface and made of non-absorbent material. This plate shall be large enough in diameter to properly support the mold without leakage. Plate glass or a metal plate is satisfactory for this purpose. A similar plate should be provided for covering the top surface of the test specimen when molded.

5.04 Samples shall be taken from the concrete immediately after it is discharged from the mixer, care being taken that the sample is representative of the entire batch. The location of the work from which each sample is taken shall be noted for future reference.

5.05 The test specimens shall be molded by placing the fresh concrete in the mold in three layers, each approximately 1/3 the volume of the mold. The successive layers shall be deposited and rodded in the manner described for the slump test, Part 4. After the top layer has been rodded, the surface of the concrete shall be struck off level with a trowel and the cover placed on the mold.

5.06 Three cylinders shall be taken from each test location and stored for curing near the job in such a manner as to maintain their temperature between 60° and 80° F. and to prevent damage or loss of moisture for a period of 24 hours. A well braced storage box of 1 inch dressed tongue and grooved lumber of proper capacity and fitted with a cover can be used for this purpose, or other suitable means which provide similar protection can be devised.

5.07 At the end of the 24 hour period, the test specimens shall be removed from the place of storage and, if desired, the molds can be removed. Thereafter the specimens shall be handled as indicated in the following, depending on the purpose of the test.

Test for Quality of Concrete as Delivered to Job

5.08 If the specimens are to be used to verify the strength qualifications of the mix as received on the job the specimens shall immediately be delivered to the testing laboratory where they shall be placed under moist curing conditions at approximately 70° F. and maintained therein until tested.

Test for Quality of Concrete as Developed Under Field Curing Conditions

5.09 If the purpose of the test is to obtain an approximation of the probable strength of the concrete of the structure under the influence of field curing conditions or as a check of the adequacy of the curing methods employed, the specimens should be kept on the job as near as practicable to the location from which they were removed. In manhole construction the specimens shall be placed on the roof of the manhole and left there for the length of time the roof is exposed. In this location, the specimens shall receive the same protection from the elements on all surfaces and in all respects as is given to the work of which they are representative. When the specimens must be removed, as when the manhole roof is covered prior to opening to traffic, they shall continue to be held as near the work as possible for not less than three-fourths of the test period before delivery to the testing laboratory. In 7 day tests this period should be 5 days; for 28 day tests, 21 days. During this latter period, specimens from manholes shall be stored inside the manholes.