

## GUIDELINES FOR 4X8 CYLINDERS

**REFERENCE** The Department will begin using 4x8 inch cylinders for Portland cement concrete test specimens beginning January 2011. Changes to CM&S 511 and 700 sampling table for 499, 511 and 526 concrete; as well as Supplemental Specification 898 and 888 list the change from 6x12 cylinders. The change was made for Departmental safety concerns.

Contracts not referencing the changes to the specification may also use the smaller cylinders provided:

1. 499 mixes (class C, S, HPC, etc.) may use the smaller cylinder molds at the discretion of the project engineer and written acceptance by the Contractor.
2. Submission of mix designs for QC/QA, SS888 and SS898, acceptance and issuance of a JMF may include 4x8 cylinder molds with written acceptance by the Contractor.
3. SS 898 QC and QA samples may use the smaller molds provided all parties are in written agreement. (However, be aware that changing mold size in the middle of a lot may increase the standard deviation and therefore affect the pay factor.)

### SS898 CHANGES

While the number of QC cylinders per sample doesn't change when using the 4x8 cylinders (the specification required three (3) 6x12 QC cylinders per sample) the number of samples tested does change. With the 4x8 cylinders, the Contractor's laboratory will make, test and report all three (3) cylinders per sample.

The intent of the 3 QC 6 x 12 cylinders was for the private lab to test 2 cylinders and if the range between the 2 cylinder results was greater than 8%, the third cylinder was tested and the highest 2 results reported. If the range between the first two cylinders was less than 8%, the third cylinder could be discarded.

For the QA specimens the number of 4 x 8 cylinders required does change. Where the QA specimens used to require four (4) 6 x12 QA cylinders made by ODOT personnel, now ODOT personnel will make six (6) 4x8 QA specimen cylinders.

The Contractor's lab takes custody all six (6) 4x8 QA specimens and cures according to ASTM specifications. At 14 days, three (3) of the 4x8 QA specimens are to be delivered to ODOT Office of Materials Management (OMM). At 28 days, the Contractor's laboratory tests the three(3) 4x8 QC specimens and three (3) 4x8 QA specimens and reports the results to the project.

A new Table10 is in the newest revised version of SS898.

## **CHANGES FOR MAKING CYLINDERS FROM STANDARD 6X12 PROCEDURES**

There are three (3) main differences when making the 4x8 inch cylinders rather than the 6x12 inch cylinders:

1. **Three cylinders are made rather than two.** 4x8 cylinders typically provide higher strength results than 6x12s, but the deviation between specimens can be higher. ASTM therefore requires that three (3) 4x8 inch cylinders be made rather than two.



2. **A 3/8 inch diameter steel rod is used rather than 5/8 inch steel rod.** Because the surface area of the 4 inch diameter cylinder is much less than that of the 6 inch cylinder, using a the larger rod will provide more consolidation to the 4x8 specimen than what is provided to the 6x12 cylinder, therefore rendering the strength results incompatible.

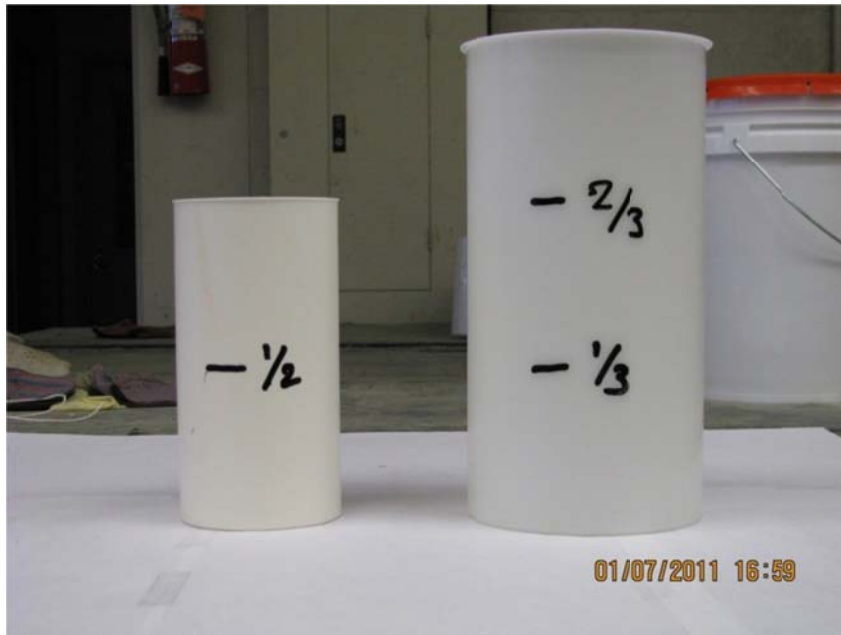
Only use the 3/8 rod for making the 4x8 cylinders. Still use the 5/8" rod for slump and air testing.



3. **4x8 specimens are made in two (2) lifts rather than three (3) lifts.** Just like for the 6x12 cylinders, rod each layer 25 times and for the top layer, penetrate the first layer 1".

Tap the sides 10 to 15 times with an open hand after rodding each layer to close the voids just like is done with the 6x12" cylinders.

A smaller scoop than normal may be prudent in order to fill the cylinder mold without spilling excess concrete.



## CHANGES FOR HANDLING AND TRANSPORTING SPECIMENS

The crates used for the 6x12 cylinders will not work with the 4x8 cylinders. Buckets with plastic inserts will be used instead.

1. After making the 4x8 cylinders, place them in the plastic bucket using the plastic insert to stabilize the specimens immediately after molding.
  - a. Make sure that the bucket is on a level surface.
  - b. Use plastic caps on the cylinder molds in order to prevent moisture loss.
  - c. Place the lid on the bucket to protect the specimens from the weather



2. In Hot Weather conditions, add water to the bucket to buffer the cylinders against the heat. Shade the bucket from the sunlight. Pour the water out of the bucket (for weight purposes) before transporting the cylinders to the lab
3. In Cold Weather conditions, cover the buckets with thermal blankets, burlap & plastic, etc. to prevent heat loss and provide a heat source if possible.
4. For projects with a curing box required by 619.02, carefully move the cylinders in the buckets to curing box after 24 hours. Otherwise, move the bucket to the field office to maintain samples within appropriate temperatures.
5. The project personnel should secure the buckets in an upright position and prevent from tipping and rolling around during transport.

The goal is to cure the cylinders at **60 to 80°F** for up to the first 48 hours.

## **CURING & HANDLING 4x8 SPECIMENS AFTER 48 HOURS**

After 48 hours in the field, cylinders should be transported in the buckets to the District or Central laboratories curing facilities.

Before shipment complete and attach the required documentation for the 4x8 cylinders (see the section below **CHANGES TO THE DOCUMENTATION REQUIREMENTS**)

The project personnel and pony driver should secure the buckets in an upright position and prevent from tipping and rolling around during transport.

If cylinders can't be sent from the project after 48 hours continue to cure in either the 619.02 cure box or at the project office (see item 4 above).

## **DELIVERY TO THE LAB**

Deliver the cylinders to the lab in the buckets with the lids. At OMM, the buckets, lids and inserts will be placed at the receiving area. In order to maintain a consistent inventory of buckets, lids and inserts throughout the state, the Pony Driver should pick up only the amount that he/she delivers.

## CHANGES TO THE DOCUMENTATION REQUIREMENTS

Since the 4x8 cylinders are in one bucket, the documentation for the sample is changed versus using the crates. Do the following:

1. Write the specimen numbers on the cylinder molds before making the samples.
2. Fill out one TE-10 tag and attach to the handle of the bucket.
3. Complete a TE-31 or print the Sample Screen; put it into a plastic envelope; and place the envelope into the bucket.
  - a. In CMS create one (1) *Air/slump/yield/strength* screen for sample. Since there are three cylinders, the third cylinder result will be reported in the Remarks Field of this test screen.
  - b. In SITEMANAGER also create one (1) test screen. SiteManager already has room for three test results.
4. Put the lid back on the bucket.



Do not write sample information on the bucket since they are reusable.**LOW CHART FOR 4X8 CYLINDERS**

