Watch for these incorrect testing practices

Erroneous results from improper testing can cause unnecessary rejection of good-quality concrete. Train your drivers to recognize some of the more common testing errors.

On a Friday afternoon in July, a technician wets down a wheelbarrow, leaving about a cupful of water in it. He samples the concrete at two regularly spaced intervals during discharge of the middle portion of the truckload and thoroughly mixes the one-cubic-foot sample. Then he runs slump and air-content tests and makes three test cylinders. He puts plastic lids on the cylinder molds and sets them next to the concrete pavement that's being placed. The cylinders remain there until Monday morning, when they're taken to the laboratory for moist curing.

Not surprisingly, the cylinders produce low 28-day test breaks, leading the owner's representative to require compressive-strength testing of three cores taken from the pavement. The core strengths slightly exceed the specified strength, solving the alleged problem, but not without wasting time and money.

Variations of this scenario are played out on construction sites far too often. And as mentioned in our November 1997 article, "How producers can correct improper test-cylinder curing," pp. 782-805, improper handling and curing of test cylinders heads NRMCA members' list of technical problems. However, the problem isn't confined to strength tests. Conducting other tests improperly can also cause rejection of in-spec concrete at the jobsite.

Have your drivers learn the correct methods for sampling concrete, measuring slump and air content, and making and curing strength-test specimens in the field. They're your first line of defense against needlessly rejected loads of concrete. Here are a few of the improper testing practices they may see, along with the usual results of the practices. ■

Acknowledgment

This is based on information presented in *Down the Chute*, a publication of Florida Independent Concrete and Associated Products Inc.

Effects of improper field testing practices

Improper practice	Effect on test result
Sampling (ASTM C 172)	
Excessive prewetting of sampling container, such as a wheelbarrow, leaving surplus water in the container.	Mixing a cup of water (8 fluid ounces) into a one-cubic-foot sample of concrete is equivalent to adding nearly 2 gallons per cubic yard. This increases slump and can cause a strength loss as high as 400 psi.
Sampling from the form into which the concrete has been placed.	Concrete from the form is unlikely to represent concrete from the truck. When concrete is placed in the forms, bleedwater comes to the surface as aggregate and cement particles settle.
Failure to remix the concrete sample in the sample container before starting the tests.	Discharging concrete from the truck chute into a sample container often causes segregation, with mortar collecting nearest the chute and coarse aggregate farthest from the chute. Tests run without remixing can show erroneous slump, air content and strength results.
Air content by pressure method (ASTM C 231)	
Failure to use an aggregate correction factor.	Incorrect high air-content reading if the aggregate is porous.
Use of the pressure meter to measure air content of lightweight concrete.	Highly variable and inaccurate results. The test method isn't applicable to concretes made with lightweight aggregates.

Publication #J980787

Effects of improper field testing practices

Improper practice	Effect on test result
Slump test (ASTM C 143)	
Failure to firmly support the base plate.	Stepping off the base may cause it to shake, increasing the apparent slump.
Base plate not large enough, allowing high-slump concrete to spill over the edge of the plate.	Most often a problem with superplasticized concrete, it increases the apparent slump.
Base not level (Figure 1).	With an inclined base, gravity tends to increase the lateral sample spread and the apparent slump.
Dampening the slump cone and base leaves a puddle of water on the base surface.	Free water on the base surface increases the lateral spread and the apparent slump. The surface should be moist, not wet.
Measuring the difference between the top of the cone and the highest or lowest point on the slumped specimen (Figure 2).	Either an incorrect low or high value. Slump measurement must be made over the original center of the top surface of the specimen.

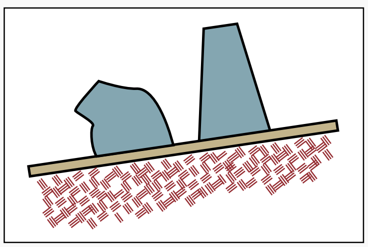

Figure 1. If the slump-cone base plate isn't level, gravity forces cause the apparent slump to be higher than the true slump.

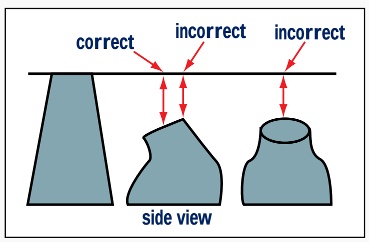

Figure 2. Measure slump by determining the vertical difference between the top of the mold and the displaced original center of the top surface of the specimen.

Improper practice	Effect on test result
Air content by volumetric method (ASTM C 173)	
Failure to dislodge all concrete in the base before rolling and rocking the air meter.	Incorrect low air-content reading. The meter must be repeatedly inverted and agitated to free concrete from the base. When the concrete has broken free, the technician will be able to hear aggregate moving in the air meter.
Failure to roll and rock the air meter long enough for all air to rise to the surface of the graduated neck.	Incorrect low air-content reading. The technician should vigorously roll and rock the air meter for about a minute, then set the unit upright and allow it to stand while air rises to the top and the liquid level stabilizes (doesn't change more than 0.1% within a one-minute period).