PCI Plant Quality Talk
Quality Enhancement Committee

NPCA National Precast Concrete Association
PCI Precast/Prestressed Concrete Institute

SERIES 2, ISSUE 9 – AGGREGATE MOISTURE

Why is understanding aggregate moisture important?

Consider this scenario for a 3 yd batch of concrete: A change in the moisture content of the sand from 2% to 6%, because of an overnight rain storm, has the same effect as adding about 18 gal. (150 lb) of water to your mixer! Sand, and even rock, can hold a lot of water that will affect concrete consistency if adjustments are not made.

The moisture content of the rock and sand used in making concrete has a large effect on the slump or spread of concrete, typically adding 10% to 40% of the total water to the mixture. The aggregate moisture can change the effectiveness of the water-reducing admixture, how much air can be entrained in a mixture, the slump life, and even the color of an architectural concrete. Allowing your batch computer to adjust for the proper moisture content of the rock and sand if using an in-line sensor on the aggregates allows a producer to consistently deliver the needed workability and strength. Proper adjustments allow optimization of concrete and save money. Below is one of many ways to determine aggregate moisture.

What you'll need

- Scale: typically one that is readable to 0.01 g
- Source of heat: electric burner or hot plate works well
- Frying pans: built-in handles help reduce the risk of burns
- Container to obtain aggregate from pile or bin
- Small scoop

Procedures

- Obtain a representative sample of the aggregate. This is a very important step in the process, as moisture content can vary widely within a bin or a pile. If taking from a pile, a quick stir with the loader before sampling helps. Taking a few scoops from different areas and recombining them in a container will also increase accuracy.
- Reduce your sample to a minimum of 500 g of rock or sand. This amount is usually adequate for determining moisture content for batching concrete.
- Weigh the sample of wet aggregate.
- Heat the sample until all of the water evaporates.
- Pro tip: To easily determine when the aggregate is completely dry, place a strip of printer paper directly on top of the heated aggregate. If the paper curls, there is still moisture evaporating from the sample.
- Allow aggregate to cool sufficiently to not damage the scale.
- Calculate the aggregate moisture to 0.1%, as shown below.

Example Calculation of Total Moisture

- Container weight: 300 g
- Container + wet sand: 1510 g
- Container + dry sand: 1472 g

$$\text{Aggregate moisture} = \frac{(\text{Container + wet sand}) - (\text{container + dry sand})}{(\text{Container + dry sand}) - (\text{container weight})} = \frac{1510 - 1472}{1472 - 300} = \frac{38}{1172} = 0.032 = 3.2\%$$

Remember to account for the aggregate absorption, as this amount of water doesn't contribute to the mixture or affect the slump, because it is inside the aggregate pores. The aggregate supplier can provide you with the absorption value.

Total moisture – Absorption = Free moisture

Use the free moisture in correcting batch weights of the aggregate and water for moisture content.

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Note: Please complete this form and return to the Quality Control Manager. All crew members should be observant and report to their foreman anything out of the ordinary on a project. *See something, say something.*

NOTES	ATTENDEE SIGNATURES
DATE PRESENTER	