

Arkansas Department of Transportation
Transportation Research Committee
RESEARCH PROBLEM STATEMENT

DATE: 08/23/2017	PROJECT AREA: Materials
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TITLE: A Standardized Foam Test for Arkansas Fly Ash

PROBLEM STATEMENT:

Fly ash is a supplementary cementitious material which can improve fresh and hardened concrete properties, reduce the cost of a concrete mixture, and prevent alkali-silica reaction in sufficient dosages. Fly ash is a by-product of coal power production and as such it contains unburned carbon in varying quantities. This unburned carbon has the effect of reducing entrained air in concrete by adsorbing air entraining admixtures (AEAs) so they are no longer able to stabilize air bubbles in the concrete mixture. This has the result of increasing AEA dosages in concretes containing fly ash. Varying carbon contents across fly ashes from different coal power plants and even in the same fly ashes over time means that ready mixed concrete plants must have a simple test to roughly determine the carbon content of a given fly ash. Ready mix plants and ARDOT could use this test to more accurately estimate the amount of AEA needed to entrain air in a particular concrete mixture. The foam test is a simple way to determine the effect of a given fly ash on air entrainment. Additional carbon content tests will be assessed, including the fly ash iodine number test. A standard test method should be prepared to help ARDOT and concrete producers better estimate AEA dosage.

OBJECTIVES:

Collect fly ashes from common sources in Arkansas (based on qualified products list or common sources used by ready mix companies) and AEAs that are in common use around the state. Use these materials in various combinations to run the foam test. Concrete mixtures [Class S(AE) and pavement mixture] containing these combinations of fly ash and AEA will be tested to determine their proper AEA dosage. Create a relationship between the foam test (or other test) and the proper AEA dosages. Compare to more precise lab tests for verification (loss on ignition, thermogravimetric analysis).

FORM OF RESEARCH IMPLEMENTATION:

Create an Arkansas standard fly ash carbon content test and a relationship to aid ready mix suppliers and ARDOT in determining the proper AEA dosage for fly ashes with varying carbon content. This will standardize a process that should save time and money for state projects using air entrained concrete.

Estimated Project Duration: 24	months
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