Air Jet Sieve Study

Introduction:

ASTM C01.25 Subcommittee on Fineness is developing a new fineness standard using air jet sieving and need your help in establishing the optimum testing conditions. If your laboratory is using air jet sieving, please test this latest set of CCRL hydraulic cements according to the provided instructions and report the results as stated in Section 4. The information requested for this study can be found in the reporting form that follows these instructions. Your results can be entered by signing in with your laboratory ID number and PIN and selecting Enter Data for Portland Cement Air Sieve.

INSTRUCTIONS FOR AIR JET SIEVE TEST

Section 1 – Procedure

1. Place 10.00 grams of hydraulic cement on the sieve. Place the sieve on the air jet sieving apparatus. Place the cover on the sieve. Turn the air jet sieving apparatus on and allow it to run for the predetermined time (Note 1). Ensure that at least 2.5 kPa (10 inches water column) of vacuum is reached. If 2.5 kPa (10 inches water column) is not reached, determine the cause and correct it.
2. Lightly tapping the (sieve?) cover two minutes before the end of the test and again one minute before ending the test can significantly reduce the amount of material sticking to the underside of the cover.
3. When the air jet sieve has stopped, remove the cover and gently brush any material off the underside of the cover onto the sieve. Restart the air jet sieve apparatus and run for 30 seconds.
4. If material is still built up on the underside of the cover, repeat step 3?. Occasionally wiping the underside of the cover with an anti-static dryer cloth has been found to reduce reside held by static charges.
5. Remove the sieve from the air jet sieve apparatus, carefully transfer the residual material to a weighing paper or pan, and determine the mass of the residue to the nearest 0.01 g.
6. Calculate percent retained.

Section 2 – Sieve Calibration

Place 10.00 grams of hydraulic cement of a known 45µm fineness (Note 2) on the sieve and follow the procedure section.

Example of Determination of Sieve Correction Factor:

Residue on a 45-µm sieve, sample No. 114, or No. 46h or a secondary standard			12.2%
Residue for a 10.00-g sample			1.22 g
Residue on sieve being calibrated			0.93 g
Difference		=	+0.29 g
Correction factor	=+ 0.29/0.93 X 100 = +31.18	=	+31.2 %

NOTE 1—The ideal time to run the apparatus can be determined by running the same sample several times until a constant mass of residue remains. For hydraulic cement, 3 minutes has typically been found to be sufficient in most cases.

NOTE 2—Use of the current lot of National Institute of Standards and Technology standard sample 114 or No. 46h is acceptable. However, this can be very costly. It is recommended that an in-house secondary standard be made and tested in accordance with Standard Test Method C430-see appendix. This may be used for calibration of the air jet sieve.

Section 3 – Calculation

Calculate the fineness of the cement to the nearest 0.1% as follows:

$$R_c = (R_s/W)\ X\ (100+C)$$

$$F = 100 - R_C$$

where:

F = fineness of the cement expressed as the corrected percentage passing the 45-µm (No. 325) sieve,
R_c = corrected residue, %
R_s = residue from the sample retained on the 45-µm (No. 325) sieve, g,
W = original sample weight, g, and
C = sieve correction factor (determined as prescribed in Section 2 of the Instructions) which may be plus or minus.

Section 4 – Report

Please provide the following information on test conditions and results:

1. Mass of sample (g) used in testing and calibration
2. Fineness standard used in calibration of the sieve (NIST No. 114 or No. 46h or internal secondary standard)
3. Sieve correction factor (%) as determined according to the provided instructions
4. Vacuum pressure (MPa or inches water column) used in testing
5. Time of vacuum running (sec)
6. Fineness of the tested sample as percent passing to the nearest 0.1%
7. Any comments

Example:

Sieve correction factor, C	=	+31.2%
Residue from sample being tested, R_s	=	0.88 g
Original sample weight, W	=	10.00 g
Corrected residue, R_c	=	(0.88/10) X (100 + 31.2)
	=	11.5 %
Corrected percent passing, F	=	100 – 11.5 = 88.5 %

CCRL PROFICIENCY SAMPLE PROGRAM
PORTLAND CEMENT SAMPLES NO. 203 AND NO. 204
OPTIONAL STUDY ON FINENESS BY AIR JET SIEVE
REPORT FORM

RETURN TO: R. Haupt, Supervisor, PSP
Cement and Concrete Reference Laboratory
4441 Buckeystown Pike, Ste C
Frederick, Maryland 21704
FAX: 610-834-7066

FROM: _____

e-mail: _____

Enter test results at our website: www.ccrl.us

Air Jet Sieve			
	Sample No 203	Sample No. 204	CCRL Test ID
Vacuum pressure used (nearest 0.1 kPa) *			1
Length of time vacuum applied (nearest 1 second)			2
Residue retained on sieve (nearest 0.01 g)			3
Sieve correction factor (nearest 0.1%)			4
Sieve calibration standard used (NIST SRM No. 114 or 46h, or internal secondary standard)			5
Corrected percent passing (nearest 0.1%)			6
Comments			

Note: Read and follow the instructions provided when performing the test for this study. Perform this test on cement taken from the physical test sample (7,800 g sample).

* 1kPa = 4.01 inches of water column
  1kPa = 101.97 mm of water column

Tests performed by _____ Date _____
Tests reported by _____ Title _____
Phone_____ Fax _____ CCRL Laboratory Number_____