

Test Method for Measuring NIST 46h Portland Cement Fineness Standards on LA-960V2

Introduction

Cement is a key construction material, commonly used as a binder in concrete, mortar, and grout. It is a fine powder made primarily from limestone (calcium carbonate), clay, and other minerals. When mixed with water, it undergoes hydration, which causes it to harden and bind other materials together. Standard reference materials such as cement fineness standards were designed to assist in the calibration of particle size instruments. The level of fineness is an important characteristic used in the qualification process within the cement industry, therefore, the Partica LA-960V2 may serve as a beneficial tool for quality control within the cement industry.

Analytical Test Method

Applicable instrument: LA-960V2 with PowderJet and vacuum nozzle sampler.

Set the Basic Measurement Conditions

- Sample Information:
 - o Sample Name: 46h
 - o Material: Cement
 - o Source: NIST
 - o Lot Number: (found on bottle)
 - o Refractive Index: (1.70-1.00i)
 - o Form of Distribution: Manual
 - o Iteration Number: 15
 - o Distribution Base: Volume
- Advanced Measurement Conditions
 - o Insert the medium nozzle into cell head
 - o Set Max T% to 99.5% and Min T% to 95%
 - o Set feeder speed to 90 and Air pressure to 0.10 MPa.
 - o Set the data acquisition time for sampling to 50,000.
 - o Set the refractive index to 1.70-1.00i.



Figure 1. The Partica LA-960V2 laser scattering particle size distribution analyzer.



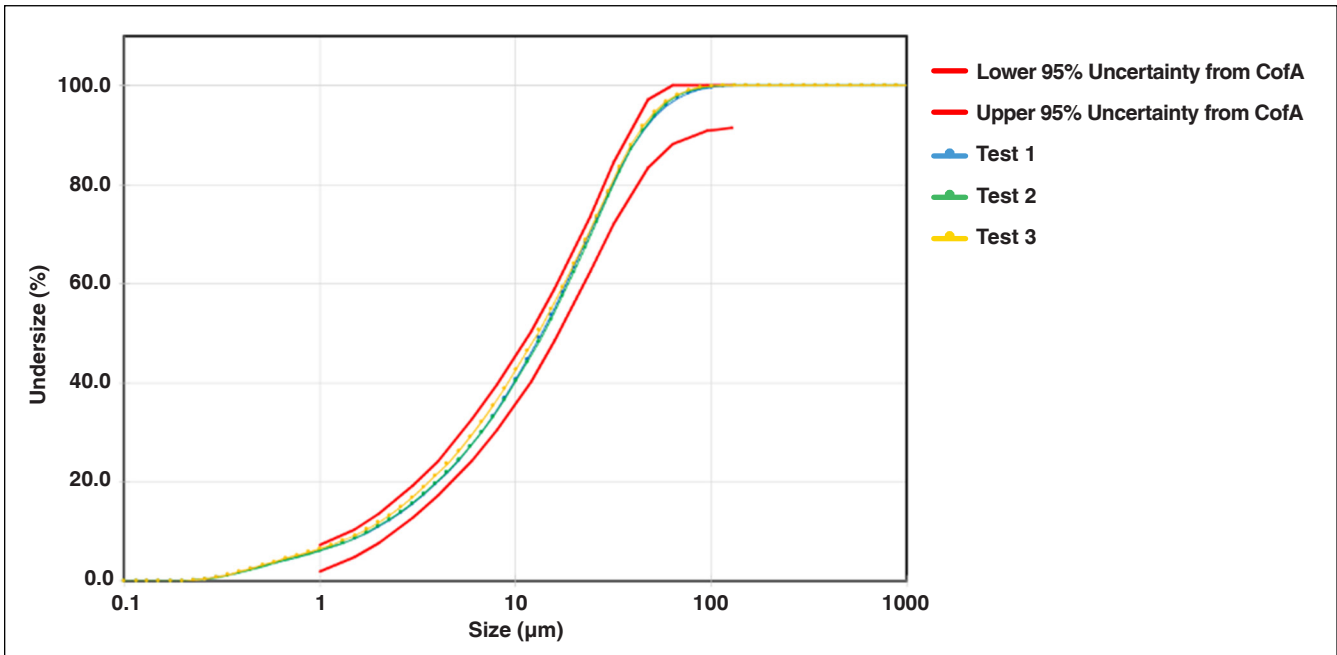
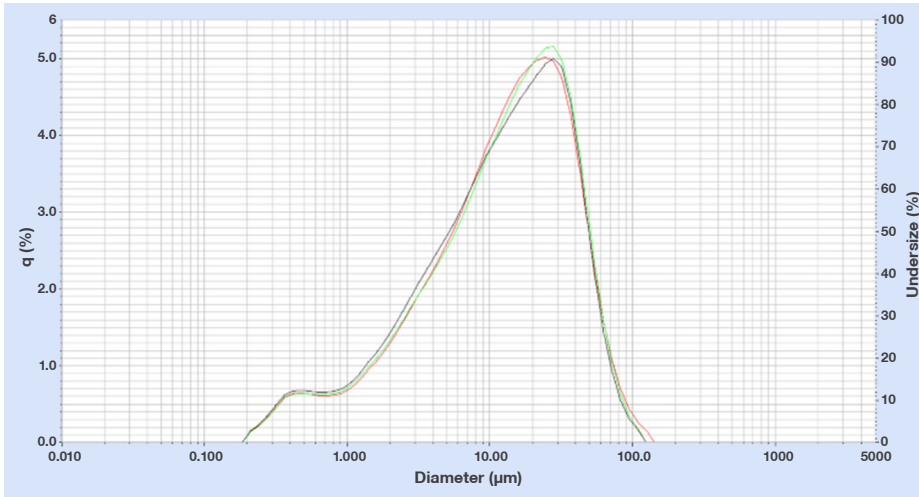
Figure 2. The sniffer tray sliding under the vacuum nozzle attached to the PowderJet.

Test Procedure:

1. Riffle one 5 g bottle of 46h cement into 20 representative aliquots.
2. Add 2 aliquots (about 0.5 gram) evenly on the sample channel on the sniffer.
3. Click Auto measure.
4. Slide the sniffer tray steadily across the vacuum tube once measurement begins.
5. Repeat with the other 2 aliquots.

Results

Below is an example of results from measuring the 46h cement standard with the LA-960V2.



Particle Size (µm)	Lower 95% Uncertainty from CofA	Upper 95% Uncertainty from CofA	Test 1	Test 2	Test 3
1	1.8	7.2	6.1	6.1	6.5
1.5	4.7	10.4	8.5	8.6	9.2
2	7.6	13.5	10.9	11.1	11.8
3	12.7	19.2	15.6	15.8	16.9
4	17.2	24.1	19.9	20.1	21.6
6	24.3	32.7	27.5	27.6	29.5
8	30.4	39.5	34.3	34.1	36.3
12	40.1	50.2	45.9	45.3	47.6
16	48.5	59.1	55.5	54.6	56.6
24	62.3	73.5	70.1	69.3	70.6
32	72.0	84.5	80.5	80.1	81.0
48	83.3	97.1	92.2	92.5	93.1
64	88.1	100.0	96.8	97.2	97.5
96	90.9	100.0	99.4	99.7	99.7
128	91.4	100.0	100.0	100.0	100.0
5000	100.0	100.0	100.0	100.0	100.0