

Measuring of Cement

SALD-2201 and DS-5

Alternative instruments and accessories leading to similar results:

- SALD-2201 with DS-21
- SALD-2300 with DS-5
- SALD-3101 with DS-5/DS-21



Background

The modern term „cement“ originates back to the ancient Romans, who produced a concrete-like mortar and called it “Opus Caementitium”. The Pantheon in Rome build 118-125 AD is a lasting example of ancient work of concrete.

Cement is a hydraulic adhesive, meaning a material that, after contact with water, hardens as well in air as under water. The resulting high stability is based on a chemical reaction in which the water transforms with the cement´s components into interlocking, needle shaped crystals.

Portland cement for example is manufactured from a precision-metered combination of cement clinker, gypsum and other components. Its chemical composition

consists of around 58 - 66% CaO, 18 - 26% SiO₂, 4 – 10% Al₂O₃ and 2-5 % Fe₂O₃.

Apart from its chemical and mineralogical composition, the fineness of the cement determines product characteristics. Generally spoken cement with finer particles develops a higher strength.

Measurement

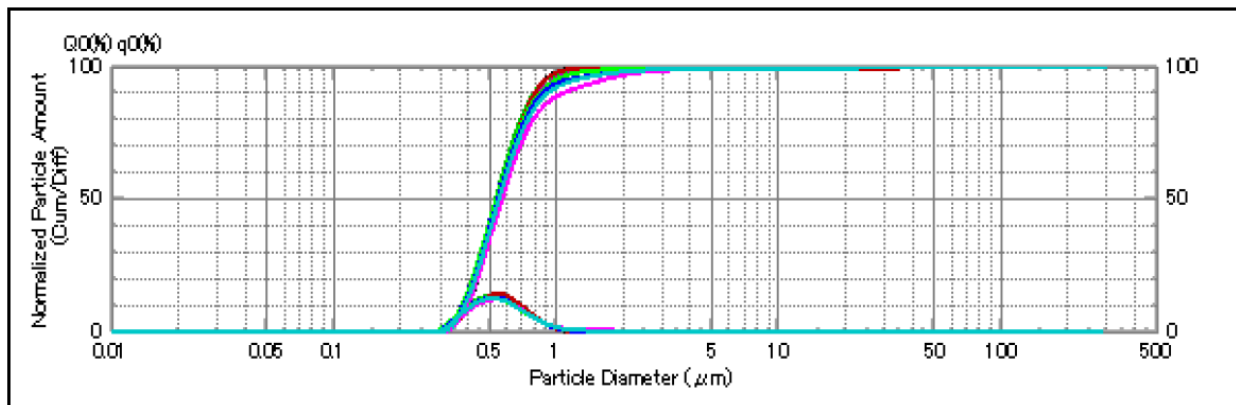
Water as a solvent is not suitable to perform the measurements. Therefore Isopropanol can be used. Otherwise instead of using any liquids the cement can be measured as a dry powder.

For the measurement Shimadzu´s dry measurement unit DS-5 was used. To perform a measurement the cylindrical sample cell was filled with the cement powder up to a height of 0.5cm.

During the measurement the sample cell rotates around its own axis and pressurized air (4bar) disperses the sample within the sample cell. Simultaneously the sample is sucked out of the cell through a needle passing the measuring chamber of the particle size instrument.

To increase the efficiency of the dispersion process Shimadzu´s dry measurement unit uses TWO dispersion systems to disperse the sample. A good dispersion is essential to measure single particles and not agglomerates.

Results



	File Name	Sample ID	Sample No.	④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭ ⑮ ⑯ ⑰ ⑱ ⑲ ⑳	④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭ ⑮ ⑯ ⑰ ⑱ ⑲ ⑳	④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭ ⑮ ⑯ ⑰ ⑱ ⑲ ⑳	Std Dev	Ref Index
1	Sample3_15			0.548	0.562	0.555	0.125	1.70-1.00i
2	Sample3_14			0.545	0.562	0.552	0.125	1.70-1.00i
3	Sample3_10			0.528	0.562	0.537	0.125	1.70-1.00i
4	Sample3_12			0.530	0.562	0.547	0.148	1.70-1.00i
5	Sample3_11			0.536	0.562	0.553	0.143	1.70-1.00i
6	Sample3_09			0.548	0.562	0.554	0.123	1.70-1.00i
7	Sample3_13			0.530	0.562	0.548	0.148	1.70-1.00i
8	cement_01			0.540	0.562	0.566	0.165	1.70-1.00i
9	cement_04			0.563	0.562	0.611	0.193	1.70-1.00i
10	cement_05			0.546	0.562	0.577	0.171	1.70-1.00i

Above graph shows a number based particle size distribution of cement powder.