

MOISTURE DYNAMICS OF EXPANDED SLATE LIGHTWEIGHT AGGREGATE

When suitable shales, clays, and slates are heated in rotary kilns to temperatures in excess of 1100° C (2012°F), a cellular structure is formed of essentially noninterconnected spherical pores surrounded by a strong, durable ceramic matrix that has characteristics similar to those of vitrified clay brick. **

ASTM procedures prescribe measuring the “saturated” (*misnamed in the case of LWA’s; partially saturated after a 1-day soak is more accurate*) specific gravity in a pycnometer and then determining the moisture content on the sample that had been immersed in water for 24 hours. After a 1-day immersion in water, the rate of moisture absorption into the lightweight aggregate will be so low that the partially saturated specific gravity will be essentially unchanged during the time necessary to take weight measurements in the pycnometer.¹

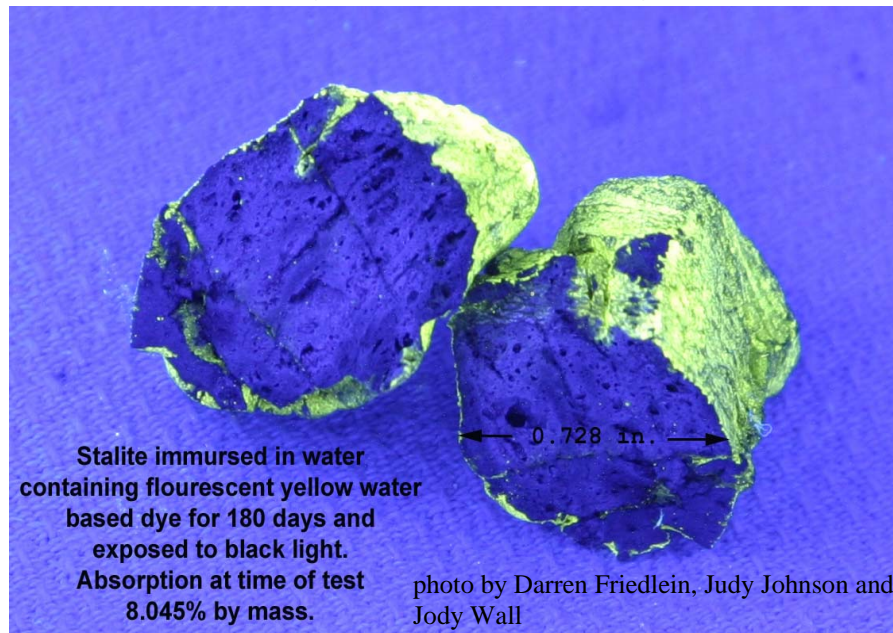
** *Lightweight Aggregate Soil Mechanics: Properties and Applications*
T.A. Holm and A.J. Valsangkar

Research at Stalite has shown that the non-interconnected spherical pores in Stalite expanded slate lightweight aggregate do not completely fill when submerged in water. The research has shown that only the exterior pores and interior pores connected by micro cracks or fissures fill with water. The below picture is of expanded slate lightweight aggregate produced in North Carolina. In the research the material was submerged in water containing florescent water

based dye for a period of six months. The material was removed from the water and the absorption percentage was determined.

The absorption percentage of the materials averaged 8.0%. Sample was then dried and broken to reveal the interior pore structure. The

exposed pore structure was viewed under a black light to determine penetration of the water and dye. The water and dye had only penetrated the exterior pores and interior pores connected by micro cracks or fissures.



SPECIFIC GRAVITY VS ABSORPTION OF STALITE LIGHTWEIGHT AGGREGATE

The following tests were performed at Stalite's lab in Gold Hill, North Carolina. The material tested was the 1/2" structural aggregates from our production stockpile. The material was washed over a #4 screen and oven dried at the beginning of the test. The material was submerged in water at 73°F for durations as shown below. The original sample mass was large enough to allow for portions to be removed and tested for absorption and specific gravity while the remainder of the sample remained submerged. This allowed for continuous submersions as listed below. The specific gravity was tested by the pycnometer method as described in ACI-211. The absorption was tested after towel drying the aggregate as described in ASTM C-127.

Time submerged	Specific Gravity	Absorption %
Dry	1.43	0
1hr	1.46	3.4
4 hr	1.46	3.8
8 hr	1.47	4.1
24 hr	1.50	6.6
48 hr	1.50	7.2
120 hr	1.51	7.9
336 hr	1.51	8

