

BENTONITE TABLETS: BREAKING THROUGH THE MYTHS AND MISUNDERSTANDINGS



As with many other drilling fluids, grouts, and sealants on the market today, there are a lot of myths and misunderstandings about bentonite tablets (also referred to as pellets). Many believe that bentonite tablets are somehow inferior to bentonite chips in their ability to seal a well bore, exhibit structural integrity, and are more problematic to place down a well bore. Both bentonite chips and tablets are commonly used in well abandonment and sealing the annular space above the well screen area on waterwells and environmental monitoring wells, and this article will hopefully dispel some myths, misunderstandings, and questions about bentonite tablets.

Bentonite tablets were never intended to replace bentonite chips, but were designed to overcome some of the shortcomings of bentonite chips. Because of the added processes required to manufacture bentonite tablets, they are more expensive and therefore are cost prohibitive for some well abandonment applications. Bentonite chips are made from bentonite that is stockpiled and allowed to field dry to a specific moisture content and then screened to the proper size, whereas bentonite tablets, made from a higher quality of bentonite than chips, is first field dried to a specific moisture content and then dried in a rotary kiln dryer. After kiln drying, the bentonite for tablets is screened to a granular consistency (30 – 50 mesh) and then compressed into tablets that are sized to 1/4, 3/8, and 1/2 inch in size.

MYTH I: STRUCTURAL INTEGRITY

The fact that tablets are made from a higher quality of bentonite which is dried in a rotary kiln and then compressed, gives tablets the ability to soak up water even faster than chips and gives tablets the ability to swell even greater than chips.

One simple demonstration of the superior swelling and structural integrity of bentonite tablets to chips is to hydrate both chips and tablets in 2 inch PVC pipe for a couple of hours and then try to push the hydrated bentonite out using a piece of 1inch PVC pipe with caps on both ends. When performing this demonstration using a laboratory press, 50 pounds per square inch of pressure was required to move the chips. Under the same conditions, 96.5 pounds per square inch of pressure was required to move the bentonite tablets.

Another way of determining the structural integrity or hardness of hydrated bentonite tablets and chips is with a device called a cone penetrometer, which consists of a heavy metal cone that is dropped into the bentonite and the amount of penetration is measured. In conducting the cone penetrometer test five times

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on both chips and tablets and averaging the results, medium chips yielded an average of 57.8 millimeters, while the tablets averaged 38.2 millimeters, which tells us that the cone penetrated the chips 51.8% further than did the tablets. This indicates that the chips have a softer hydrated set than the tablets.

MYTH II: PROBLEMATIC PLACEMENT

One can simply look at the irregular shape of bentonite chips in comparison to the uniform and rounded shape of bentonite tablets and safely determine that chips are going to have a slower sinking rate through water than tablets. In conducting a sink rate test, an 8 foot section of clear 6 inch plastic pipe was filled to the top with water and a mark was placed to indicate 7 feet of depth. This test was replicated forty times for both chips and tablets and the average sink rate for both chips and tablets were determined from the results. Medium chips yielded an average sinking rate of 0.83 feet per second while the 3/8 inch tablets yielded an average sinking rate of 1.07 feet per second (chips had an average sinking rate that was 22.4% slower than tablets).

Another interesting result from the sinking rate test was the amount of variance in sinking rate time results between chips and tablets. The average sinking rate time difference between the slowest chips to the fastest sinking chips was 0.426 feet per second whereas the variance was 0.21 feet per second with tablets, which can be directly attributed to the irregular shape of chips and the uniform shape of tablets.

CONCLUSION: MYTHS BUSTED

Without a doubt, bentonite tablets provide superior structural integrity and sealing capabilities, along with a faster sinking rate (less placement problems) than bentonite chips, and bentonite tablets also yield/hydrate twice as fast as bentonite chips do. These factors are important to an environmental well contractor or waterwell contractor who wants to seal and isolate the area above a well screen gravel/filter pack to prevent grout from penetrating into the production zone or seal around tight annular spaces. Bentonite tablets can be easily delivered, via a tremie pipe, to the desired depth quickly and accurately.