Hall 4.2 / booth 407

Filter material made of glass beads

Source: ETC – GmbH

Fig. 1: SiLi beads Glass beads

To use glass beads **(Fig. 1)**, in the vernacular also referred to as marbles, as a filter material sounds very exotic, but it is not. Because for some time now, glass beads have been used in contemporary well construction as supporting material of boring holes for drinking water extraction. In 2007 they were used to fit the first well, a solid stone well in Rosstal, Fürth [1] district. In the meantime, in this sector glass beads have established themselves as a replacement for filter sand and gravel, because due to the homogenous shape and the diameter distribution of glass beads the so-called regeneration effort in wells can be reduced.

Benefits like the significantly higher abrasion resistance and therefore the non-application of the lung-endangering silicate dust when filling and hardly existent settling behaviour after filling also argue for glass beads with this application. Some other positive properties, such as the homogeneous pore volume of the fill, the ideal ball shape and the even surface could, however, also result in benefits for an entirely different form of use.

Source: [3]

Fig. 2: Two identical quick filters

Source: [3]

Fig. 3: Filling process – Glass beads

If the glass material is very suitable in well boring holes, it is to be assumed that it may also be suitable as filter material for quick or slow filters in water preparation.

Theoretical considerations

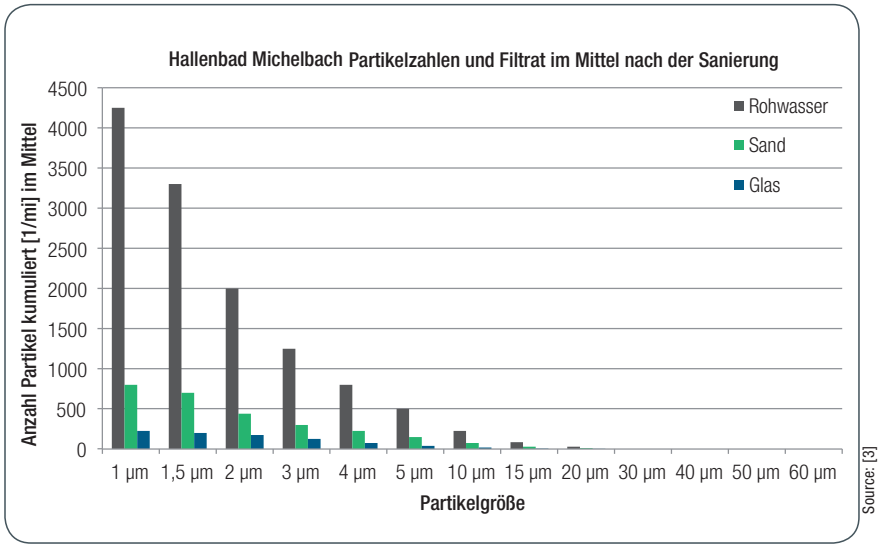
According to Kozeny-Carman [2], when filling glass balls compared to filter sands, permeability that is about 36 percent higher results. This results in greatly reduced energy consumption. Significant savings can also be expected when rinsing.

Outlook

Due to the preliminary comments set out, it can be expected that when using glass beads as a replacement for filter sand and gravel major quantities of energy and water can be saved. The major technical experiments in a school swimming pool near Schwäbisch Hall have been as good as completed.

With a preparation circuit, the pool offers with two identical quick filters **(Fig. 2)** the ideal conditions for a comparison test. To this end, one filter remained in the original status, the other filter was converted with glass filter beads of the same filling heights and same grain size for a direct comparison **(Fig. 3)**.

The test, overseen by the local health office, the operator Stadtwerke Schwäbisch Hall, has not yet been completed. Since the start of the test in January 2011, glass beads (type SiLi-S) have been in use without interruption and have provided excellent results since.



Source: [3]

Fig. 4: *Particle measurement conducted in the indoor aquatic centre of Michelbach: Direct comparison of sand filters with glass bead filters*

The main result becomes clear from **Figure 4** (particle figures): Glass beads clearly had the better elimination rate than sand. Glass beads are extremely suitable for use in swimming pool water processing. The same can be expected from the flocculation filtration in drinking water processing. The fact that the more homogenous properties of glass beads result in lower pressure losses, which means that energy and rinsing water can be saved, was not confirmed by this test, because identical material was, unfortunately, not used.

To this end, further practical tests will be necessary, which are scheduled for the coming months. Plants of interest parties abroad and in Germany intend to use glass bead filter material and themselves test them for savings potential rigorously.

Literature:

[1] Specialist report „Use of glass beads as a replacement for filter gravel in foundations“, special print from book 5/2008 BBR Specialist Magazine for Well and Line Construction. By: Dipl.-Ing. (FH) Frank Hermann and Xaver Stiegler, Firma Ochs Bohr GmbH, Nuremberg

[2] Lecture script winter semester 2008/2009 „Circuit of fluids“, Prof.-Dr. Nikolai Bagdassarov, Geophysical Institute of the University of Frankfurt/Frankfurt am Main

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