

Concentric well screen filter design

Concentric well screen filter design

Inspiration

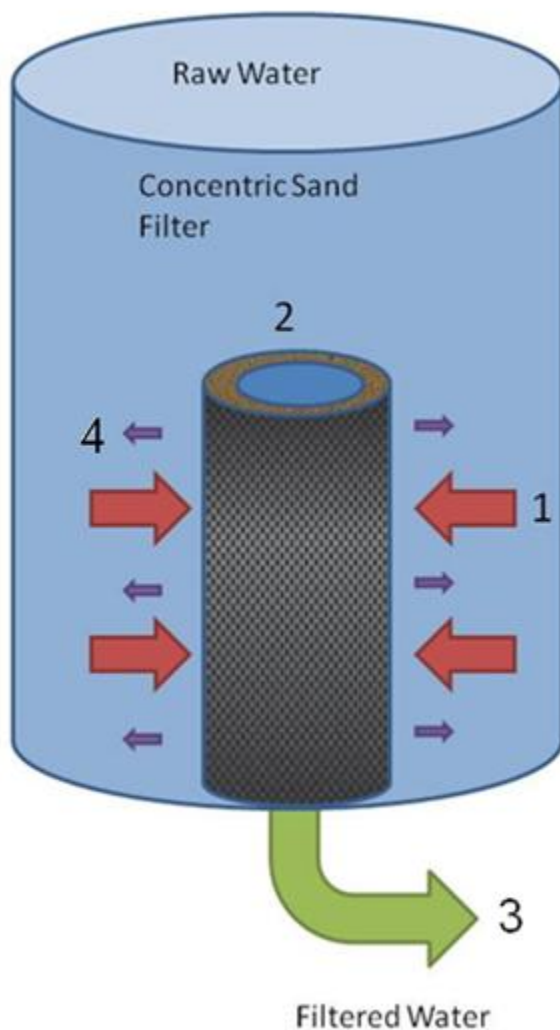
We sought to design a filter which would optimize the filtration surface area while keeping the filter in a small container. In this design we wanted to improve on the traditional sand filter by changing the geometry of filtration.

Design summary

- The filter consists of two concentric well screens. The well screens are porous pipes which enable water to pass through but prevent sand from escaping. Pore size is on the order of 0.45mm.
- The concentric pipes are separated by a layer of packed sand. This packed sand is essentially a cylindrical filter bed.
- Raw water enters through the outer well screen, passes through the sand, and exits through the inner well screen.
- When backwash cycle is initiated, the flow is reversed and the bed is expanded analogous to conventional backwash.

Operation

- 1) Raw water enters reservoir and passes through Filter. (red arrows)
- 2) Water passes through sand and exits through inner well screen.
- 3) Filtered water (green arrows) exits to clear-well (not pictured).
- 4) When backwash cycle (purple arrows) is initiated, sand is expanded and particles exit through screen.



Discussion

While the surface area of the filter is increased, the design would be difficult to manufacture. The well screens also make it difficult to replace the sand or observe the filter. The well screens are expensive and would be difficult to seal. Additionally, headloss across the screens would reduce efficiency and expansion of the bed would be constrained in the concentric pipes.