

With over 16 years of experience in the field we have become an expert in instrumentation and station installations. QuakeLogic engineers will define with you the best solution and provide a quality service to ensure optimum performance of your monitoring systems.

## GLASS BEADS VS. SILICA SAND FILL FOR GEOTECHNICAL BOREHOLE SENSOR INSTALLATION

In geotechnical borehole installation, the seismic sensor is slowly dropped down to the bottom of the borehole.

The sensor needs to be covered by filler. We strongly recommend pouring filling material to cover at least half part of the sensor, where the sensor is located. It is not recommended to cover more than half the length of the sensor as serious problems will arise in case of retrieval of the sensor from the hole for re-orientation or maintenance.

Two common filling materials used are glass beads and silica sand.

Glass beads are solid glass spheres. These spheres, manufactured from colorless glass, have high strength, chemical stability, limited thermal expansion, and good flowability. They are often used as fillers. These tiny glass fillers resemble white sand or salt crystals in appearance.

The moisture acts as a lubricant within the soil, sliding the particles together. Too little moisture means inadequate compaction. It means that the particles cannot move past each other to achieve density. Too much moisture leaves water-filled voids and subsequently weakens the load-bearing ability.

Due to the nature of sand, fill sand doesn't retain moisture and is great for allowing drainage in areas that are likely to get wet.

In geotechnical downhole array applications, **glass beads fill may be preferred over silica sand fill** to cover at least half part of the sensor. The reason for that the sand may get exposed to cementation over time with moisture.



**Glass Beads**



**Silica sand**



Earthquake Risk Management Solutions

Cementation involves ions carried in groundwater chemically precipitating to form new crystalline material between sedimentary grains. The new pore-filling minerals form "bridges" between original sediment grains, thereby binding them together.

**The cementation process may impact the retrieval of the sensor from the borehole.**