

Drilling Methods and Techniques for Installing CMT Wells in Unconsolidated Aquifers

Drilling Method	Advantages	Preferred CMT Installation Technique	Comments
Sonic	Advancing casing during drilling minimizes redistribution of contaminants in borehole. Steel casing prevents borehole from collapsing as CMT well is being built. Vibrating casing during removal reduces likelihood of bridging annular materials.	Place CMT tubing into casing with anchor plate attached to bottom of tubing. Use tubing centralizers to center tubing inside of sonic casing. Add alternating lifts of sand and bentonite pellets* as casing is withdrawn, either by gravity placement, tremie methods.	Depths up to 300 feet. Use casing with an inside diameter (ID) of at least 4 inches. Addition of water to casing may be needed to prevent heaving as casing removed.
Hollow Stem Auger (HSA)	Rigs widely available. Augers provide temporary casing that can be withdrawn as CMT well is constructed.	Place CMT tubing with anchor plate into borehole inside of hollow stem augers. Add alternating lifts of bentonite pellets and sand pack from surface as augers are removed. CMT tubing centralizers may be needed to keep annular space open during well construction.	Generally limited to depths of approximately 100 feet. Water may need to be added to augers to counteract heaving sand conditions. Use augers with at least a 4-inch internal diameter (ID).
Direct Push (DP)	Rigs are widely available.	Insert CMT tubing into DP casing, then withdraw casing.	Best for shallow installations where sand collapses around CMT tubing. May be difficult to tremie sand and bentonite due to small annular space between CMT tubing and DP casing.
Air Rotary with Casing Advance	Casing prevents borehole from collapsing as CMT well is being built. Consistent-diameter borehole. Prevents redistribution of contaminants along borehole wall during drilling.	Place CMT tubing into casing with anchor plate. CMT tubing centralizers should be used to center tubing in borehole. Add alternating lifts of sand and bentonite pellets* as casing is withdrawn, either by gravity placement, tremie methods.	Select casing with at least a 4-inch ID. Addition of water commonly needed to prevent heaving as casing removed.
Mud Rotary	Widely available.	Place CMT tubing directly into borehole with anchor plate attached to bottom of tubing. CMT tubing centralizers should be used to center CMT tubing in borehole. Place sand pack and bentonite with a tremie tube and grout pump.	Thin drilling fluid as much as possible prior to installing annular materials. Use a coarse-grained filter pack. Mud filter cake can be difficult to remove with development methods available for CMT wells.

* Coated bentonite pellets do not hydrate as quickly, therefore these pellets are useful for deeper applications, however some coated pellets give off either ethanol or acetone, and can cause elevated detection limits of some target compounds. Typically, uncoated pellets are suitable for depths up to 100 ft of water.