

WELL CASING – STEEL OR PLASTIC

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In the grocery store we are often asked “paper or plastic?” We have a choice based on convenience and our perception of recycling benefits. However, the selection of casing for a water well is not something that can be left to consumer choice. The professionals responsible for the design and construction of a well make their decisions to use steel or plastic based on practical installation criteria, the type of equipment they will be using to construct the well, state and local code requirements and perhaps also on cost. The purpose of a well is to provide access to the aquifer. Once constructed, the well is the conduit for the pumping system that will bring water from the aquifer for use at the surface.

Casing provides support for the wall of the well so that loose rock fragments or unconsolidated sand and gravel through which the well has penetrated do not collapse into the well shaft. The casing protects the electrical wires, pull cable and water tubing/piping that are connected to the submersible pump. It also provides a vertical-cylindrical surface that in conjunction with the outer vertical wall of the drilled hole can facilitate the placement of an impermeable grout seal around the well casing. The grout seal in the annular space outside of the casing prevents surface water and potential contaminants (bacteria, fertilizers, pesticides etc.) from descending along the outside wall of the well down to the zones of stored ground water.

Steel casing for water wells has been the material of choice for most of the last century. However, with improvements in strength, durability and corrosion resistance of polyvinyl chloride (PVC) plastics over the last two decades, PVC casing has very common as a casing material for drinking water wells.

The type of casing that will be used in a well depends on several factors including water chemistry and geology. The corrosivity of the water is an important factor. High (alkaline) or low (acidic) pH values may be corrosive to metal pipes. Similarly, water with high levels of dissolved solids (“salts”) may also be corrosive to metal pipe resulting from galvanic current (electrolysis). PVC is a thermoplastic material that is very resistant to pH corrosion, is not conductive, and therefore is not susceptible to galvanic corrosion.

Many wells are drilled through unconsolidated rock materials before reaching solid bedrock. The process of “seating” the casing into bedrock is frequently accomplished with a drive-shoe that is tightly seated before drilling continues at a smaller diameter (without casing) through the bedrock. A driller, using proper care and technique, can seat steel or PVC casing satisfactorily into bedrock.

Steel casing can withstand the high temperatures generated by curing cement grout. A driller using established cooling methods to maintain a proper temperature for the casing also can grout PVC casing successfully. Bentonite clay grout (without cement) provides an excellent seal. A bentonite clay seal does not generate heat as it sets up around the casing.

Installation of well casing must avoid excessive bending or vertical (downward compressive or upward tensile stresses) that can deform or crack casing materials. Damaged casing can reduce the well's integrity and make it difficult or impossible to install pumping equipment. It may also be difficult to remove equipment for well maintenance or equipment repair if the well casing is not installed properly.

Over much of the United States, and in a wide range of geologic conditions, either steel or PVC casing is used. The question about “steel or plastic” for well casing is a decision that should be left to the professionals. Ask your driller to explain the choices to you prior to starting the well.

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