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# ENVIRONMENTAL Fact Sheet

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## Secondary Well Seals and Liners

### What are they?

Secondary well seals, also known as seal packers, well packers, Jaswell-type seals, or Jaswell seals, are flexible rubber cylindrical shaped inserts with circular rings designed to provide a water tight seal between an attached smaller diameter well casing and the larger diameter well bore.

Shale packers or shale traps are flexible rubber cone shaped inserts designed to fit between an attached smaller diameter well casing and the larger diameter well bore and is designed to prevent material placed above it, such as a grout seal, from passing by it and into the well.

These devices are well construction peripherals that are designed to create a seal that prohibits surface water, poor quality groundwater, sediment, or broken rock from entering the well. Secondary well seals are most commonly used as a tool to remedy poor water quality conditions in a well by sealing off unwanted water bearing or sediment producing zones, however, they are sometimes used as a primary seal used in cable tool well construction. Shale packers are most commonly used as a tool to provide a secondary bridge to prevent sediments or rocks from entering the well by sealing off intervals of weathered or unstable bedrock formations.

### Applications

- Sealing of poor water quality zones
- Sealing of weathered rock fractures contributing sediment to a well
- Sealing of salt contaminated zones from the application of road de-icing chemicals
- Sealing off intervals of weathered or unstable bedrock formations (caving conditions)
- Sealing of existing wells with failed primary seals (Not applicable for new construction)
- Repairing wells damaged by earth movement (frost action, earthquake, blasting, etc.)
- To create a primary seal in cable tool construction
- To create a plug for accepting a grout seal

## Installation

The seal is threaded onto a smaller diameter well casing, usually 4" or 5", for domestic applications, and installed into the well, seal end first. The assembly is pushed into position approximately 10 or more feet below the suspected problem area. Once installed, water or sediment entering above the seal is trapped within the annulus between the inner casing and the larger well bore. Some contractors install the seal on both ends of the inner casing, to avoid the entrance of unwanted water spilling over the top of the casing and back into the well.

For permanent installations, it is recommended that the annular space created between the 6" diameter well and the smaller inner casing is sealed by filling the area with cement or bentonite grout or chips.

## Primary Seals Required

A primary seal used in bedrock well construction is required by rule. Regulations adopted by the N.H. Water Well Board require that well casings be sealed to the bedrock to prevent groundwater or contaminants from entering the well at the bottom or anywhere along the length of the casing. Well casings shall prevent intrusion of contaminants from the ground surface or from unconsolidated surficial deposits into the well. In order to perform this function, a hardened steel drive shoe is required to be installed on the end of the casing. A larger diameter hole must be drilled into bedrock, to an appropriate depth, to accept the casing and provide a seat, or socket, for the drive shoe. The only exceptions to the use of a drive shoe seal are for cable tool construction and when plastic well casing is used. In these applications, a Jaswell seal or Jaswell-type seal may be used for the primary seal.

Secondary well seals are not considered an appropriate repair or substitute for a properly installed primary seal in new well construction.

## Disadvantages

- 1) **Not always reliable.** Secondary well seals are designed to be installed in a smooth round hole. Unfortunately, well bores are not always round and are rarely smooth. Sometimes it is difficult to seat the seal properly so it doesn't leak.
- 2) **May shut off water.** When seals are installed to seal off unwanted poor quality water or to repair a sediment problem, the well owner always runs the risk of shutting off all of the water supply. Then this option is not a practical solution to the problem.
- 3) **Pump retrieval may be difficult.** Submersible pumps are usually slightly less than 4 inches in diameter. Therefore, the installation of the pump into a 4 inch casing is a tight fit. Installing the pump is not difficult; however, removing the pump from the well at a future date may prove to be a challenge.
- 4) **Torque arresters not installed.** Torque arresters are required on submersible pump installations to center and stabilize the pump in the well. The turning and twisting action exerted on the pump by torque created from starting and stopping may cause the pump wire to rub against the walls of the well, chaffing the wire. Eventually, excessive chaffing will cause pump failure. Unfortunately, torque arresters cannot be installed in conjunction with a secondary well seal installation.

## **Policy Statement**

The NH Water Well Board has adopted a policy that secondary well seals are useful tools when used properly and for the correct application. Properly installed, they can make the difference between a potable water supply and no water at all. However, these seals shall not be approved for use to remedy an improperly installed primary seal in new well construction.

## **Suggestions**

Most contractors use 4" PVC casing for the well liner. However, some contractors have found that using schedule 40 steel casing in lieu of PVC has resulted in a better installation. PVC casing is sometimes not rugged enough for the application. In circumstances where the well has a caving condition, the well is not straight, or the installation will be very deep, steel casing may be the best choice for the job.

Decisions regarding sealing of the annular space with cement or bentonite grout above the secondary well seal should be made on a case by case basis. In temporary installations, applications designed to keep out sediment problems, and applications where multiple seals or packers are required, the use of grout may not be necessary or desirable. However, in applications that are designed to keep out unwanted water, a grout seal should be installed.

When installing a submersible pump through a 4 or 5 inch casing, the pump wire should be sleeved with ¾" to 1" poly pipe. The sleeve will protect the electrical cable from abrasion and chaffing against the interior surface of the rock well and will aid in retrieval of the pump in the future.

Down-hole video cameras are available to the water well industry today and have proven to be useful tools in diagnosing well problems. These tools are also very helpful in determining where to install a secondary seal in the well to achieve the desired result.

## **For Additional Information**

Please contact the Drinking Water and Groundwater Bureau at (603) 271-2513 or [dwgbinfo@des.state.nh.us](mailto:dwgbinfo@des.state.nh.us) or visit our website at [www.des.nh.gov/dwgb](http://www.des.nh.gov/dwgb). All of the bureau's fact sheets are on-line at [www.des.nh.gov/dwg.htm](http://www.des.nh.gov/dwg.htm).

Note: This fact sheet is accurate as of January 2007. Statutory or regulatory changes, or the availability of additional information after this date may render this information inaccurate or incomplete.