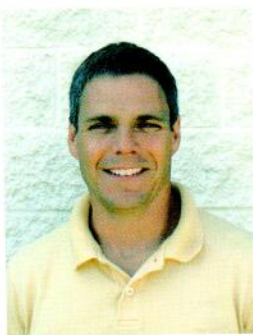


Leaking Pools

Turning headaches into profit opportunities

by Lance Anderson



A leaking pool is more than just a headache for the homeowner. While the pool owner faces high water bills, excessive chemical usage, and the risk of additional structural damage, you – as their pool professional – are faced with the equivalent of finding a needle in a haystack.

The average residential pool has over 112 sq m (1,200 sq. ft.) of structural surface area and hundreds of feet of underground plumbing. In all of this area, you are looking for something as small as the head of a pin, (a 1.6 mm (1/16 in.) diameter hole can release hundreds of gallons of water a day). The task seems daunting, so it's no wonder many service technicians cringe at the thought of having to find a leak.

The reality, however, is that with a minimal investment in equipment, an understanding of basic physics, and a little bit of practice, this necessary part of any pool professional's duties can become a truly profitable and satisfying part of their business.

Because leak detection is perceived to be a difficult task, those that have mastered the simple process find that they can charge premium service rates just to find the leak. In addition, most leak jobs directly result in additional repair, renovation or liner replacement business.

Leak detecting is a mental game that involves synthesizing clues from a variety of different sources. The process of moving from initial identification of a leak symptom to exact location of the leak is most efficiently accomplished when the job is approached using a three-step process.

First – gather a base of information

about the pool and the suspected leak with the objective of confirming there is indeed a leak problem that is worth your trip to the pool, and establishing suspected leak areas.

Second – isolate the problem area by doing a pressure test. The objective of this step is to eliminate non-leaking areas of the pool as well as to identify areas that will be inspected using more sophisticated and time-consuming leak location procedures.

Third – pinpoint the leak using different techniques and equipment depending on where the problem area is (plumbing, gunite, vinyl, etc.).

A pool owner's concern generally results from the observance of some symptom caused by water escaping from, or something being pulled into (air or dirt), the pool system.

While the most obvious symptom of a leak is a dropping water level, increased chemical usage, excessive algae growth, high water bills, or evidence of water outside the pool may also be indications of a water loss problem that could be masked by an automatic fill device. Air or dirt being pulled into the pump and/or blown into the pool is the most obvious indication of a suction side leak.

Before investing too much time in looking for a leak, it is important to determine that the symptoms you or your customer have identified are indeed the result of a leak and not some other problem.



Above: Electronic leak detectors work by releasing a small electrical charge into the pool water through a float placed at the bottom of the pool.

Left: A ground connection is made outside the pool at a piece of conductive metal pounded into the ground.





Above: 'Ground' and 'Input' cables are plugged into a battery-powered booster to produce detectable electrical current flow.

Right: A probe is attached to the end of a telescopic pole.

Make sure that air being pulled into the pump or blown into the pool is not the result of cavitation caused by an obstruction in the suction line or an oversized pump. Most importantly, though, check to be sure that water loss is indeed due to a leak and not evaporation.

Depending on a variety of pool and environmental conditions, evaporation rates can vary greatly and account for up to 2.5 cm (1 in.) of water per day.

To determine the evaporation rate of a particular pool, place a bucket filled with water into the pool on the first or second step, (this assures the water in the bucket is exposed to the same conditions as that in the pool). Fill the pool to its normal operating level and mark the water level in both the bucket and the pool. Measure the amount of water loss in both over a 24-hour period and compare the difference. If the bucket loses the same amount of water as the pool, all of the water loss is due to evaporation and not a leak. This 'Bucket Test' is something that the pool owner can be instructed to do without you having to make a trip to the pool.

Gather Information From The Pool Owner

Assuming the observed symptoms are indeed the result of a leak, gathering other information from the swimming pool owner before visiting the pool can be helpful for later leak detection steps. Who built the pool? How old is it? What kind of pool is it? Are there any additional water features? Has there been any recent construction activity around the pool? When did it start leaking? The answers to all of these questions can be helpful in preparing for the job and confirming a suspected leak location.

A final step in the information-gathering step is to make careful observations at the swimming pool when

you arrive. Look for obvious problems especially around the equipment. Check the backwash valve to make sure water is not leaking to waste. If air is evident in the pump, try pouring water over the exposed fittings while the pump is operating. This often causes a leaking fitting to stop pulling air, temporarily eliminating the evidence of air in the pump. Careful observations at the pool site can provide many clues about the location of a leak.

Putting The Pressure On

Regardless of whether the leak is suspected to be in the plumbing or the structure of the pool, a pressure test should be done to provide confirmation of which parts of the pool are leaking, and which parts can be eliminated as suspected leak areas. This is important not only because it saves time in later

leak location steps, but also because it allows the technician to provide the pool owner with the assurance that leaks that have been found and fixed are the only ones in the pool.

To do a pressure test, closed test plugs are used to block off all but one of the exposed openings of a section of plumbing. A pressure induction system is put in the remaining opening (usually at the equipment). Water is then put into the line through the pressure tester and the system is brought up to no higher than 20 psi. A pressure drop indicates a leak. A line that holds pressure can be eliminated as a

potential leak area.

While a pressure test of the entire plumbing system may be adequate in situations where a structural leak is suspected, individual sections of plumbing should be tested if a plumbing leak is suspected. Valves at the equipment can often be used to isolate these sections as long as they are tested first. Do so by testing from the equipment to the closed valves to see if they hold pressure.

Water is used for this isolation pressure test because it does not compress under pressure and thus gives more accurate and quick results. Water is also advantageous for this test because if test pressures get higher than a safe level, plugs that pop out under water pressure will not fly from the openings as dangerously as those that pop-out under air pressure.

Accept no compromises when it comes to the sealing effectiveness of your test plugs. Tapered winterizing plugs have a tendency to pop out under test pressures wasting valuable time and putting anybody in the area at risk of injury. Plugs with straight-sided rubber and large corrosion-resistant hardware allow for extra sealing area, easy expansion and ultimately more accurate results.

Your pressure induction system should allow for easy access to a variety of different plumbing openings and allow the introduction of either water or air (for later leak location steps) into the plumbing. A system utilizing various sizes of open stem plugs, which can be quick connected to the





Above: A signal processing unit produces an audible clicking sound when the probe is pointed in the direction of electrical flow.

pressure tester, provides the ability to do this without having to cut lines or jerry-rig fittings. A pressure tester must include a 0-30 psi gauge, hook ups for a garden hose and air line, a valve to control these and block off the system, as well as a means of releasing pressure from a line that has been tested but does not leak.

Follow Your Ears

Once the isolation step has been completed you should know whether the leak is in a plumbing section or in the structure of the pool. Different location methods will be used depending on where you are looking for the leak. To find leaks in underground plumbing, the most effective method is 'sonic location'.

The key to effective sonic location is creating a distinct sound at the leak that can be detected with special listening devices designed to pick up vibrations in the ground. This distinct sound is created by getting air to escape from the leak into water-saturated soil, producing a bubbling, gurgling sound very similar to what you would hear if you were to blow through a straw into a glass of water.

It is important to note that any water in the line will stay at the low end of the plumbing even as air is being added to the line. Thus, a good noise will not be produced until all of the water above the leak level has been purged from the line. To assure air is reaching the leak, it is often helpful to purge all water from the line before attempting a sonic location.

Using the same pressure testing setup that was used for the isolation test, a constant stream of air from a regulated air source (small compressor or nitrogen tank) is fed into the line to maintain a pressure of no higher than 20 psi (5 to 10 is often enough). A listening device is then moved along the path of the buried line to detect the loudest most distinct sound. This sound will most often be directly above the leak. Listening devices are now available that also allow listening for leaks through the wall of the pool; a technique that often offers a more direct path to the leaking plumbing.

Assuming there is no problem in the plumbing, the only place for the leak to be is in the structure (or shell) of the swimming pool.

Although sophisticated detection systems can be used for finding leaks in vinyl liners, finding leaks around fittings or lights in these swimming pools, and in gunite swimming pools, still requires visual inspection.

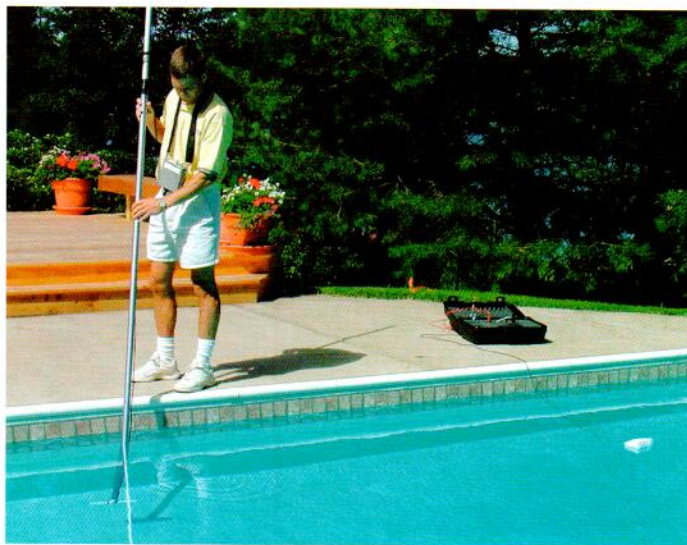
Dye Testing

Dye testing provides a means of identification if visually identified leak locations are actually losing water. A small amount of dye is squirted within 5 mm or 6 mm of a suspected leak to see if that dye is pulled out of the pool with the escaping water. The pool should be filled to its normal operating level and the circulatory system turned off before dye testing. It is also helpful to assure that the pool has been cleaned prior to testing, as some leaks will be plugged up by dirt or debris and therefore will not draw dye.

A dye tester is simply a syringe that holds a concentrated dye and has several advantages over simple test reagent bottles that are commonly used for this procedure. First, it uses a long nozzle that allows precise application of the dye without creating unwanted water currents. Secondly, the syringe allows the dye to stay concentrated even when used while diving (squeeze bottles, on the other hand, suck in water when released, diluting the dye).

In a concrete pool, start at the tile line and work your way down. Check the skimmer and any joints or cracks inside the skimmer itself as well as at the point where the skimmer bonds to the pool wall. Any penetration through the pool wall is a suspect location. Check around the returns, lights and finally along any visible cracks in the pool. To completely survey all parts of the pool, it will be necessary to get in the water. Diving equipment will allow a thorough survey of areas in the pool below what is reachable from the deck.

Skimmers, return fittings, stair gaskets and lights should be dye tested in a similar way in vinyl liner pools.



Above: As the probe is brought closer to the leak, the clicking sound increases in frequency allowing leaks to be pinpointed in minutes.

Tracking Vinyl Leaks With The LeakTrac

Visually inspecting every inch of the liner itself is certainly a possibility. However, an electronic vinyl liner leak detector offers a much faster and efficient solution especially in cold or dirty water.

Using innovative electronic technology, detectors such as the 'LeakTrac2200' will quickly find even the smallest leaks in the most complicated liner patterns while the operator stands on the pool deck.

The portable, battery-operated LeakTrac works by putting a small electrical charge into the pool water through a float that is positioned near the middle of the pool. A ground connection is made outside the pool at a ladder anchor, diving board anchor or a piece of conductive metal

Pressure Testing Safety Rules

- Turn off all equipment before testing.
- Use straight-sided test plugs.
- Do not over expand a plug to make it fit a larger hole.
- Never exceed 20 psi pressure (5 psi maximum on openings > 5.1 cm (2 in.))
- Stand clear of plug openings.
- Release pressure immediately after test and before removing plugs.
- Never use an unregulated air source.
- Use well maintained equipment.

pounded into the ground, (screw driver or piece of rebar). The electricity put into the pool spreads out from the float in all directions seeking a way to complete its circuit and get to ground.

The electricity is drawn to any conductive penetration through the liner, creating a flow of electricity in the pool that can be detected with a probe attached to a telescoping pole. When the probe is pointed in the same direction that the electricity is moving toward the leak – a beeping noise is created. As the probe is moved closer to the leak, this beeping increases in frequency until it becomes a steady 'scream' when it is directly on top of it. Once leaks have been found and marked, repairs can often be made from the pool deck.

When leaks are approached following this systematic procedure, the entire leak detection process can usually be completed on most residential pools within one to two hours. While thoroughness and attention to detail are important, the process is not complicated. The basic techniques that have been presented in a condensed version in this article (more complete instruction is available on a CD-ROM program available from Anderson Manufacturing Co., Inc.) along with some hands-on practice, are really all that are needed to turn pool leaks from headaches into profits. □

Lance Anderson is president of Anderson Manufacturing Co., Inc., in St. Paul, Minnesota, a manufacturer of tools and equipment for pressure testing, leak detection and repairs. For more information on the Anderson leak detection system, call 1-800-348-1316 or visit the company web site at www.leaktools.com.

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