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DETECTING POOL LEAKS

USING AUDIO AND VISUAL EQUIPMENT TO INVESTIGATE WATER LOSS ISSUES



Pool leak detection can be a matter of inspecting each line internally via a camera—from the pool to the pump—looking for any obvious problems.

Photos courtesy Pipetech Solutions

Sometimes, homeowners suspect (or even know) their pool is leaking prior to closing it for the season, but in many cases, they wait until spring to confirm it. Some pool owners think the leak will fix itself, and sometimes it does—temporarily. This rarely happens though. In fact, it usually becomes worse before they decide to take action, whether doing something themselves, or hiring a professional.

Before the pool owner panics, there are some things they can do on their own, while other things they cannot. It all depends on their abilities and the time and effort they are willing to invest. Further, the seriousness of the problem also plays a factor

in how long the homeowner can wait before an experienced professional arrives on scene to provide the appropriate diagnosis and means for repair for the circumstances.

Depending on severity, repairing a pool leak will vary by cost and effort as each possible resolution is considered. However, before anything can be fixed, the first task at hand—and one of the most important—is to establish whether a leak is actually occurring and, if so, where it is located.

Preliminary investigations

There are generally three primary reasons for water loss: evaporation, liner rips or shell cracks, as well as bad seals around lights and other

fittings, and the pump's supply and return system. Liners and plumbing are typically the two primary problem areas.

Some preliminary steps can be taken if the source of the leak is not obvious. For example, bubbles can be seen in the pump's viewing port or from a jet stream into the pool. Also, the presence of any unexplained water seen in and around a careful examination of the general equipment area.

One easy leak determination test involves placing a strip of electrical tape on the pool wall to mark the current water level and then monitoring it to see how much water is being lost. Over the course of a 24-hour period, it is typical to see the water level drop approximately 6 mm (0.25 in.) below the tape mark in an uncovered pool due to evaporation in hot, dry weather.

An alternative, more accurate method that eliminates the variable of evaporation is the bucket test. This involves filling a bucket with water and placing it inside the pool area, on the steps or left floating, for example. Any noticeable mismatch that eventually occurs between the two water levels is confirmation of a leak. This procedure can also be repeated with the pump on and off to further isolate



A quick visual inspection of all the equipment located above ground (i.e. pump, filter, heater, and hoses) should be performed as part of the preliminary investigation.

where the leak might exist. If water loss is noticeable only when the pump is operating, then the pool liner/shell can potentially be ruled out as the source of the leak.

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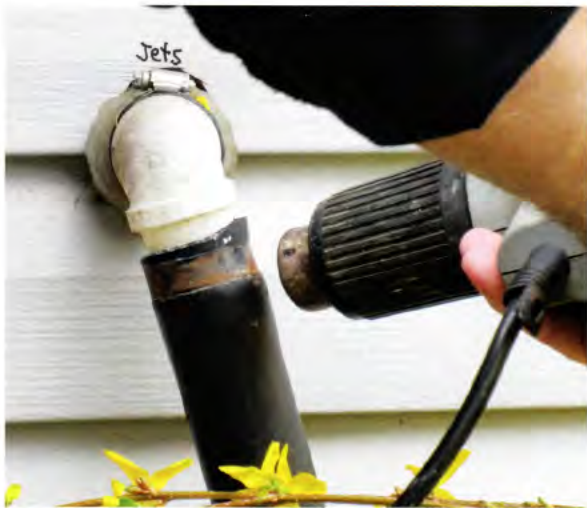
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Plumbing connections are disconnected to perform the camera inspection.



A camera is used to inspect the skimmer line.

While mathematical calculations can be performed to determine just how much water is lost, and consequently how large a leak may be, it is rather irrelevant. The point is to establish if a leak really exists and that it is not simply evaporative water loss, and whether the cause of a leak is the liner/shell or the pump system.

Leaky pipes

Water loss can also occur when there are holes in the jet or skimmer lines and fittings, or in mounting plates and light fixture openings at or through the pool wall, too. Therefore, service professionals should not jump to any firm conclusions. For example, standing water can drain back through the lines until the water level reaches a point that is lower than the leak where it will stabilize.

If the pool is equipped with a bottom drain, then its seal to the liner or even the plumbing line running back

up to the skimmer/pump can be at fault. For test purposes only, an overturned bucket can be placed on top of the pool's bottom drain (using a weight to hold it down), to stop any water from seeping out. This allows the service professional to investigate other possible areas where a leak might be present.

Of course, there can be more than one leak, but the liner is always the first and is usually the easiest to identify or rule out as the likely source. As part of these preliminary tests, a quick visual inspection of all the equipment located above ground (*i.e.* pump, filter, heater, and visible hoses) should be performed. For instance, a leaky pump gasket seal or fitting can be the culprit and can be missed if these preliminary checks are not completed.

CASE IN POINT

For example, on one particular service call, this author located two leaks in the jet lines beneath the deck of an older (30-years plus) residential pool. It had a simple, standard layout of two jets, one skimmer, and a filter and pump located in the homeowner's garage approximately 9 m (30 ft) from the pool.

In this case, the homeowner inherited the pool after purchasing the property and suspected a leak was present during the first year of operating the pool. During this period, they had already determined the leak was in the supply/return lines and not the five-year-old vinyl liner.

After the preliminary checks were performed, it was time for a professional to inspect the pool's underground system. This is where the real detective work begins. The primary tools comprise a suite of underwater video cameras (to inspect the underground plumbing internally) and sophisticated listening devices (which are attuned to capturing the unique sounds produced by water as it leaves the pipes into the surrounding soil).

DEPENDING ON SEVERITY, REPAIRING A POOL LEAK WILL VARY BY COST AND EFFORT AS EACH POSSIBLE RESOLUTION IS CONSIDERED. HOWEVER, THE FIRST TASK AT HAND IS TO ESTABLISH WHETHER A LEAK IS ACTUALLY OCCURRING.

THE REAL INVESTIGATION BEGINS

Using cameras and microphones, the investigative plodding begins. This first involves inspecting each line internally (where possible) via camera—from the pool to the pump—looking for any obvious problems. For example, any signs of breaks in the line caused by a stone that has gradually worked its way through the pipe wall, or splits or broken fittings (such as tee and elbow joints, or line connectors).

The exact location and depth of the pipe run and its fittings is also determined with the use of specialized locating equipment that reads a signal transmitted by the camera when it is inside the pipe. This allows the technician to flag the lines above ground on the grass or garden areas and outline them in chalk on the pool deck as they travel underground.

In doing this, when the precise location of a leak is identified and confirmed after using the cameras and microphones, these marked locations play a factor in determining what is causing the leak, as well as what recommendations can be offered to the homeowner with respect to the repair. In some cases, landscaping might have damaged a line or ground settlement could have occurred, resulting in surface cracks in the pool deck.

During this service call, the author found three such possibilities: two confirmed beneath the deck and one suspected under the lawn.

YIELD TO PRESSURE

Unfortunately, even when using high-quality cameras, some holes or cracks in the pipe walls or broken fittings are not always readily visible—especially when the system is not under pressure.

That said, after performing the next step, which involved pressurizing the jet line and then listening above ground for the sound of escaping water and air, this author confirmed a leak in the tee joint connection to one jet located beneath the concrete pool deck.

At the same time, this procedure allowed a number of other suspected locations to

be confirmed or ruled out. Pressurizing a suspect line involves plugging the jets/skimmer lines after disconnecting the plumbing near the pump to apply a varying combination of compressed air and water

while monitoring a gauge for results and listening with the microphone.

Many service companies will readily perform this test, however, they may not have the specialized equipment or the experience



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The camera inspection also helps to locate the route of the plumbing lines.



Plumbing lines are flagged above ground on the grass and/or garden and outlined in chalk on the pool deck.

required to determine where the plumbing lines run or locate where air is escaping from the line. Being able to say, "there's a leak in line A" does not mean much if it cannot be pinpointed where the problem is occurring in what can often be a long length of pipe in varying configurations. Some companies rely on hydrogen or helium sensing techniques, which involve pressurizing the lines to attempt to find the escaping molecules with a gas detector as they reach the surface. There are limitations to this method, however.

As previously discussed, the visual inspection, tracing, and sound detection steps can take a considerable amount of time and expertise to

accurately locate a leak. Essentially, the technician is assembling a puzzle applicable to all the unique circumstances at hand. Each and every uncovered fact has to fit together into a comprehensive, precise situational 'picture' that accurately confirms the entire set of circumstances and findings. Things are not always as they initially seem.

DISCOVERY AND PLAN OF ACTION

After successfully locating the first problem, which was a tee joint beneath the concrete pool deck with approximately 457 mm (18 in.) further along to the jet, this author identified another leak via sound picked up by the microphone along the second pool jet line. With confirmation of the three problematic areas, the customer was provided with the appropriate recommendations for repair.

This advice often varies depending on the location of the leak(s), cost and effort of repair, the customer's preferences, and the technician's expertise. That said, it can range from a spot repair to a replacement of the entire line, but even then there are variations in how to best approach the problem and their corresponding solutions.

For example, in some cases, it may be a simple matter of hand digging into the flower garden to cut out a section of the old pipe and install a new coupling. In other situations, rerouting the lines may be suggested—even above ground, over the deck, and back to the pool—especially when it is an interior pool or there are exterior landscaping features that can make the repair impractical. Thanks to technology, however, in these extreme situations, a new epoxy pipe (of varying lengths) can sometimes be built inside the existing plumbing without the need for excavation.

In this particular situation, as two leaks were located beneath the concrete pool deck and the 30-plus-year-old pool was plumbed using black polyvinyl chloride (PVC) piping, which would likely be prone to recurring problems, the repair was a little more involved.

As a result, this author suggested a staged repair to the homeowner which was not only cost-effective, but would also provide long-term viability.

With only two lines present, which ran relatively short, direct, and parallel distances along with the open expanse of property between the garage and pool deck, and being only 152 mm (6 in.) below ground, replacing the lines would be relatively easy.

To fix the two problems beneath the pool deck, however, the homeowner had the option to simply

link up the new jet line to the faulty tee joint or continue the repair another few inches to the nearest jet. With this in mind, this author advised the client to redo the one jet assembly, as a narrow channel had to be cut into the concrete pool deck to reach the tee joint. It was prudent to do so for this short section of old pipe (from the tee joint to the jet) as it would be susceptible to failure. The same procedure was suggested for the second jet as well.

Further, while any new tee joint could be placed in the same position as the previous one, it was suggested that they both be relocated to a central distribution position outside the pool deck, with the two subsidiary jet lines continuing independently from a new manifold-like location under the garden instead of the deck. Performing the repair in this manner was more effective as it would result in less deck removal, in addition to saving time and effort.

Many customers are rightfully concerned when a leak is found beneath the pool deck; however, these situations are not always as terrible as initially thought. For example, with proper care, the deck can be precisely cut open using a concrete saw to expose the trouble area, thus minimizing damage. The key is being absolutely certain of where the leak is occurring, which is why qualified leak detection services are invaluable.



A locator is used to read the signal being transmitted by the camera below ground at one suspect leak location in the lawn area.



Pressurizing a suspect line involves plugging the jets/skimmer and disconnecting the pipes near the pump to apply a combination of compressed air and water while monitoring the gauge for results.

COMPLETING THE REPAIR

There are also several options when it comes to repairing the pool deck. In this case, the two cuts would have been less than 152 mm (6 in.) wide as they ran from the outer deck edge straight to the pool jet. Therefore, instead of patching the concrete, this author suggested the installation of a short run of similar size paving stones as a way to create a decorative accent to the pool deck. Completing the repair in this manner also permits easy access should any future issues arise. Further, this technique can be repeated for the second jet, as well as the skimmer should problems ever occur in these locations.

It was subsequently learned that once the homeowner proceeded on their own, using this author's recommendations, they found replacing the lines to be a relatively easy method of repair (especially in their particular circumstance). As a result, they also ended up tunneling directly beneath the deck, from the side garden, to run new lines right up to the backside of the pool wall. Not every solution is as relatively straightforward, however. 💧



Dave Hutchison is the president of Pipetech Solutions, a London-Ont., based firm he started nine years ago. His company specializes in no-dig sewer inspection and repair, as well as leak detection services in the pool industry throughout southwestern Ontario. He can be reached via e-mail at dave@pipetechsolutions.com.

THE ART OF POOL LEAK DETECTION



1



One of the primary tools for leak inspection is a suite of underwater video cameras.
Photos courtesy Pipeotech Solutions



2



The exact location and depth of the pipe run and its fittings is also determined with the use of specialized locating equipment that reads a signal transmitted by the camera when it is inside the pipe.



3



After pressurizing the lines, sophisticated microphones are used to listen above ground and underwater for the sound of escaping water and air.

