

# GATHERING INFORMATION

## STEP 1: In Leak Detection

a slide show that will step you through the process



# Information Gathering

## Objectives:

- Is there really a leak?
- Establish suspected locations.
- Gather info to facilitate later steps.

## Methods:

- Discussions with pool owner.
- The Bucket Test.
- Pump On/Pump Off Test.
- Observations of the pool.

A successful leak detection job actually starts when the customer first calls with the complaint of a leaking pool. It is the information gathered before the first trip to the pool that often eliminates wasted trips and assures that later detection steps are performed efficiently.

A complete understanding of the objectives and methods of this step is important for whoever talks to customers and schedules service calls.



# Initial Information

**ANDERSON** LEAKMASTER™  
MANUFACTURING COMPANY INC. by Anderson

Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
Phone #: \_\_\_\_\_ Email: \_\_\_\_\_  
Water loss: \_\_\_\_\_ Inches / Week or Day  
How Long Been Leaking: \_\_\_\_\_  
Type of pool: Vinyl / Concrete / \_\_\_\_\_  
Main Drain: Yes / No Number of Returns: \_\_\_\_\_  
Notes: \_\_\_\_\_

Est. Evaporation Rate: \_\_\_\_\_  
Leakalyzer Reading: \_\_\_\_\_

LeakTrac Report:  
# of Grounds \_\_\_\_\_  
# of Patches \_\_\_\_\_

Other: \_\_\_\_\_

Suction Side Pressure Testing:  
Skimmer 1: Holds Drops  
Skimmer 2: Holds Drops  
Main Drain: Holds Drops  
\_\_\_\_\_ Holds Drops  
Notes: \_\_\_\_\_


Pressure Side Pressure Testing:  
Return 1: Holds Drops  
Return 2: Holds Drops  
Return 3: Holds Drops  
Return 4: Holds Drops  
Notes: \_\_\_\_\_

Skimmer Bowls / Gaskets: \_\_\_\_\_  
Light Niches / Conduit: \_\_\_\_\_  
Return Fittings / Gaskets: \_\_\_\_\_

- Type of Pool
- Age of Pool
- Builder
- Normal Pool Activity
- Recent construction or other suspect events
- How long leaking

Our goal is to maximize the efficiency of the service technician's time at the pool. A lot of very helpful information can be gathered during initial conversations with the pool owner.

# Other Helpful Information



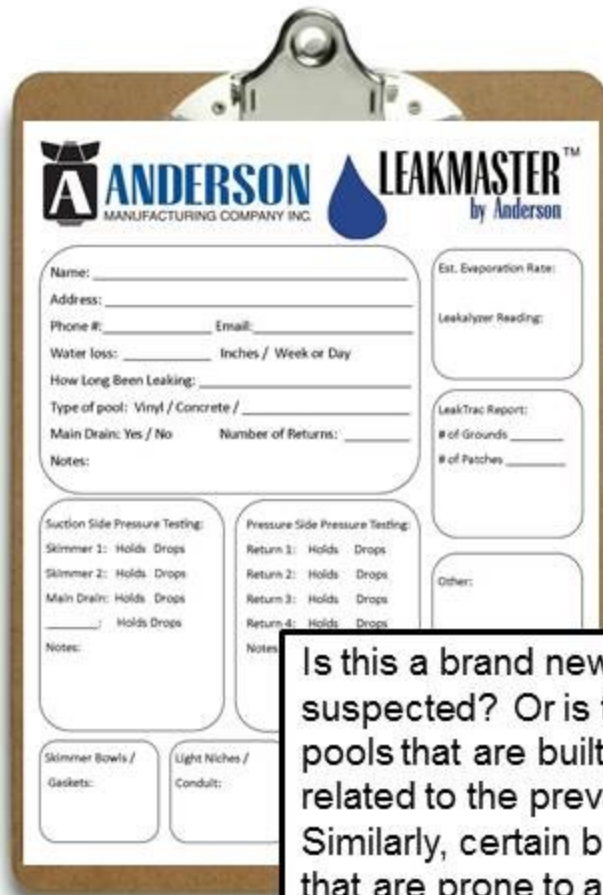
The form is titled "ANDERSON LEAKMASTER™ by Anderson" and "MANUFACTURING COMPANY INC." It contains several sections for data entry:

- Personal Information:** Name, Address, Phone #, Email.
- Leak Information:** Water loss (Inches / Week or Day), How Long Been Leaking, Type of pool (Vinyl / Concrete / ), Main Drain (Yes / No), Number of Returns.
- Leak Detection:** Est. Evaporation Rate, Leakalyzer Reading, LeakTrac Report (# of Grounds, # of Patches).
- Pressure Side Pressure Testing:** Return 1, 2, 3, 4 (Holds / Drops).
- Suction Side Pressure Testing:** Skimmer 1, 2 (Holds / Drops), Main Drain (Holds / Drops).
- Other:** A large open box for additional notes.
- Skimmer Bowls / Gaskets:** A box for skimmer bowl/gasket information.
- Light Niches / Conduits:** A box for light niches/conduit information.
- Return Fittings / Gaskets:** A box for return fittings/gasket information.

- Type of Pool
- Age of Pool
- Builder
- Normal Pool Activity
- Recent construction or other suspect events
- How long leaking

What type of pool it is? Is it a gunite, fiberglass, or a vinyl liner pool? Is there an attached spa, waterfall, or in-floor cleaner lines? Each of these situations are going to be prone to different types of leaks and require different types of detections.

# Other Helpful Information



The image shows a clipboard with a form titled "ANDERSON LEAKMASTER™ by Anderson". The form is divided into several sections for data entry:

- Header:** ANDERSON MANUFACTURING COMPANY INC. and LEAKMASTER™ by Anderson.
- Customer Information:** Name, Address, Phone #, Email, Water loss (Inches / Week or Day), How Long Been Leaking, Type of pool (Vinyl / Concrete / ), Main Drain: Yes / No, Number of Returns.
- Leak Detection:** Est. Evaporation Rate, Leakalyzer Reading, LeakTrac Report (# of Grounds, # of Patches), Other.
- Pressure Testing:** Suction Side Pressure Testing (Skimmer 1, Skimmer 2, Main Drain, ) and Pressure Side Pressure Testing (Return 1, Return 2, Return 3, Return 4).
- Notes:** Two large text areas for additional information.
- Skimmer Bowls / Gaskets:** A section for recording issues with skimmer bowls or gaskets.
- Light Niches / Conduits:** A section for recording issues with light niches or conduits.

- Type of Pool
- Age of Pool
- Builder
- Normal Pool Activity
- Recent construction or other suspect events
- How long leaking

Is this a brand new vinyl pool where a poorly sealed seam should be suspected? Or is this an old pool that may need the liner replaced? Often pools that are built in certain time periods will have characteristic problems related to the prevailing building techniques and materials used at the time. Similarly, certain builders may use/have used materials or building methods that are prone to a particular type of leak.



# Other Helpful Information

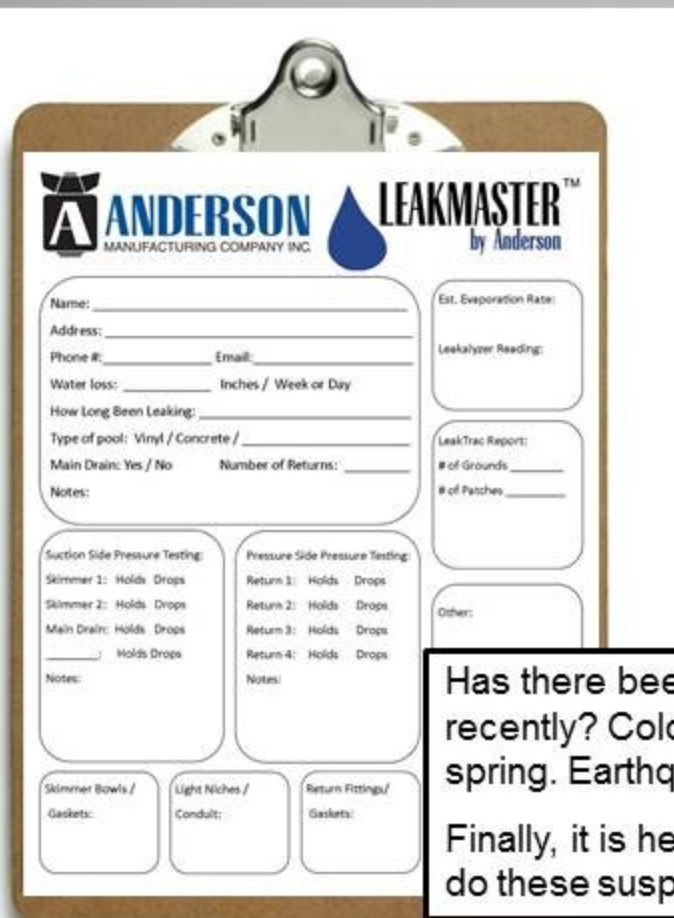


The form is titled "ANDERSON LEAKMASTER™ by Anderson" and "MANUFACTURING COMPANY INC." It includes fields for Name, Address, Phone #, Email, Water loss (Inches / Week or Day), How Long Been Leaking, Type of pool (Vinyl / Concrete / ), Main Drain (Yes / No), Number of Returns, Notes, Est. Evaporation Rate, Leakalyzer Reading, LeakTrac Report (# of Grounds, # of Patches), Other, Suction Side Pressure Testing (Skimmer 1, Skimmer 2, Main Drain, Holds, Drops), Pressure Side Pressure Testing (Return 1, Return 2, Return 3, Return 4, Holds, Drops), Skimmer Bowls / Gaskets, Light Niches / Conduits, and Return Fittings / Gaskets.

- Type of Pool
- Age of Pool
- Builder
- Normal Pool Activity
- Recent construction or other suspect events
- How long leaking

Is this a pool that's owned by a retired couple who keep it covered all of the time except for when they have people over for parties once or twice a month? Or is this a pool which is constantly used by a family? Understanding the way the pool is used can provide valuable information related to the cause of the problem.

# Other Helpful Information



The form is titled "ANDERSON LEAKMASTER™ by Anderson" and "MANUFACTURING COMPANY INC." It includes fields for personal information, pool details, and leak testing results.

**Personal Information:**

- Name: \_\_\_\_\_
- Address: \_\_\_\_\_
- Phone #: \_\_\_\_\_ Email: \_\_\_\_\_
- Water loss: \_\_\_\_\_ Inches / Week or Day
- How Long Been Leaking: \_\_\_\_\_
- Type of pool: Vinyl / Concrete / \_\_\_\_\_
- Main Drain: Yes / No Number of Returns: \_\_\_\_\_
- Notes: \_\_\_\_\_

**Leak Testing Results:**

Suction Side Pressure Testing:	Pressure Side Pressure Testing:
Skimmer 1: Holds Drops	Return 1: Holds Drops
Skimmer 2: Holds Drops	Return 2: Holds Drops
Main Drain: Holds Drops	Return 3: Holds Drops
_____ Holds Drops	Return 4: Holds Drops
Notes: _____	Notes: _____

**Other Information:**

- Est. Evaporation Rate: \_\_\_\_\_
- Leakalyzer Reading: \_\_\_\_\_
- LeakTrac Report: \_\_\_\_\_
- # of Grounds: \_\_\_\_\_
- # of Patches: \_\_\_\_\_
- Other: \_\_\_\_\_

**Skimmer Bowls / Gaskets:** \_\_\_\_\_

**Light Niches / Conduits:** \_\_\_\_\_

**Return Fittings / Gaskets:** \_\_\_\_\_

- Type of Pool
- Age of Pool
- Builder
- Normal Pool Activity
- Recent construction or other suspect events
- How long leaking

Has there been any construction activity or other suspect events recently? Cold winters often freeze pipes that have to be fixed in the spring. Earthquakes or heavy rains can also cause problems.

Finally, it is helpful to know how long the pool has been leaking. How do these suspect events coincide with the first notice of a problem?

# Other Helpful Information

The form is titled "ANDERSON LEAKMASTER™ by Anderson" and "MANUFACTURING COMPANY INC." It is designed for gathering information about a pool leak. The form includes sections for:

- Customer Information:** Name, Address, Phone #, Email, Water loss (Inches / Week or Day), How Long Been Leaking, Type of pool: Vinyl / Concrete / , Main Drain: Yes / No, Number of Returns: , Notes.
- Leak Testing:** Suction Side Pressure Testing (Skimmer 1, Skimmer 2, Main Drain, , Holds Drops), Pressure Side Pressure Testing (Return 1, Return 2, Return 3, Return 4, Holds Drops), Notes.
- Leak Detection:** Est. Evaporation Rate, Leakalyzer Reading, LeakTrac Report: # of Grounds, # of Patches, Other: .
- Pool Details:** Skimmer Bowls / Gaskets, Light Niches / Conduits, Return Fittings / Gaskets.

- Type of Pool
- Age of Pool
- Builder
- Normal Pool Activity
- Recent construction or other suspect events
- How long leaking

The responsibility for gathering information generally is taken by the one who answers the phone. It is important that this person has effective tools for transferring the information to whoever will be doing the job. Consider devoting a specific area on your work orders for recording data from the Information Gathering Step.



# Symptoms of a Leaking Pool



Customers are usually concerned about a leak because of a problem (or symptom) that is caused when something either escapes from (water) or enters into (usually air or dirt) the pool system.

Unfortunately, many symptoms of leaks are also symptoms of other problems. An important part of the Information Gathering Step is to confirm that the observed symptom is actually the result of a leak.

**NOTE:** A good way to promote your leak detection service is to make your customers aware of the symptoms of leaks and make sure they call you when they first notice one of them.

# Symptoms of a Leaking Pool



- Air or dirt in pump or blown into pool
- Difficulty maintaining pump prime

The presence of air or dirt in the pump, or blown into the pool from the return lines is a good indication of a leak in the suction side plumbing, (from the pool to the pump). Eventual pump damage and cleaning problems may result if these symptoms are not addressed.

# Symptoms of a Leaking Pool

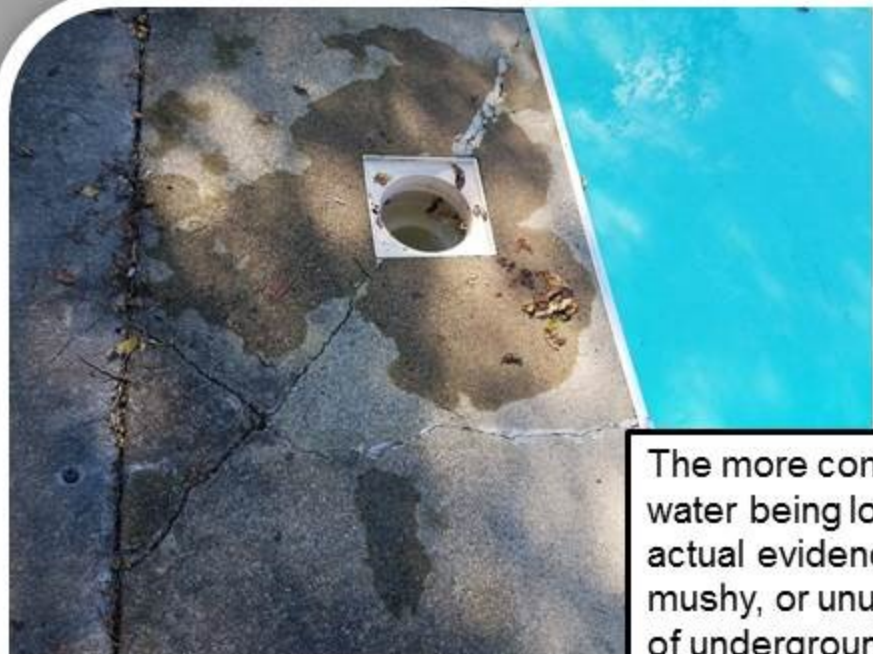


- Air or dirt in pump or blown into pool
- Difficulty maintaining pump prime

Restrictions or obstructions in the plumbing, or an oversized pump for the plumbing, are non-leak related problems that can also lead to the presence of air in the pump or blown into the pool. Such cavitations however is usually accompanied with a noticeable “laboring” of the pump.



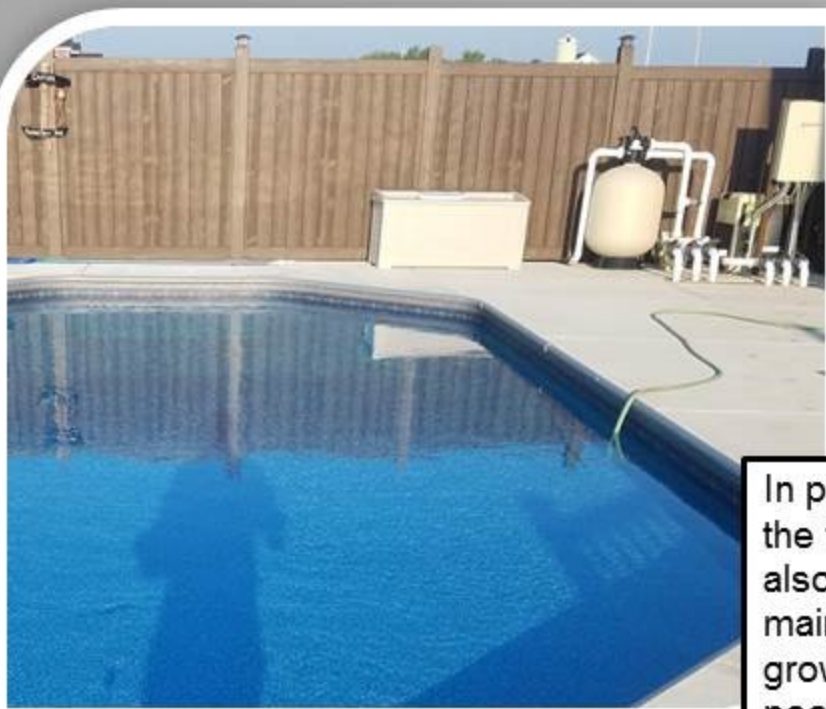
# Symptoms of a Leaking Pool



- Structural damage
- High water bills
- Excess chemical use
- Excess algae growth
- Dropping water level

The more common symptoms of leaks are those that result from water being lost from the system. The first sign of a leak may be actual evidence of the water that has escaped from the pool. Wet, mushy, or unusually “healthy” spots in the lawn may be evidence of underground plumbing leaks. Structural damage, cracks, and settling to the deck or pool may also be indications of underground leaks. If left un-repaired, these problems can quickly become more serious.

# Symptoms of a Leaking Pool



- Structural damage
- High water bills
- Excess chemical use
- Excess algae growth
- Dropping water level

In pools with automatic fill devices, high water bills may be the first indication of a leak problem. Your customers may also notice an increase in the chemicals required to maintain proper balance, or that there is excess algae growth because the new water that's being put into the pool is untreated.



# Symptoms of a Leaking Pool



- Structural damage
- High water bills
- Excess chemical use
- Excess algae growth
- Dropping water level

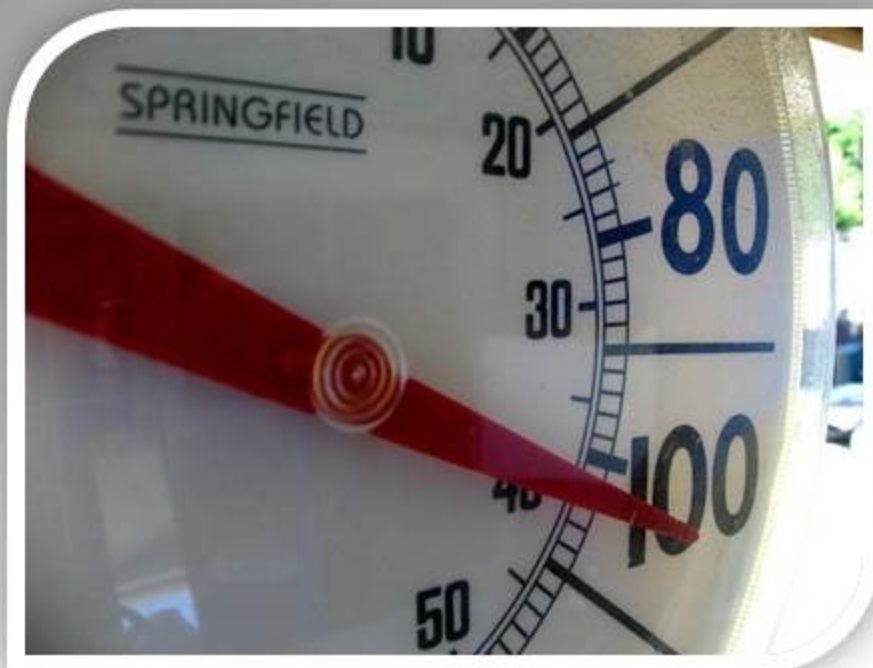


By far the most common indication of a leak is that the water level is dropping faster than what is "normal."

The big challenge is to determine what is normal and thus avoid looking for a leak that is not a leak at all, but instead, water loss due to evaporation.



# Evaporation Rate Depends on:

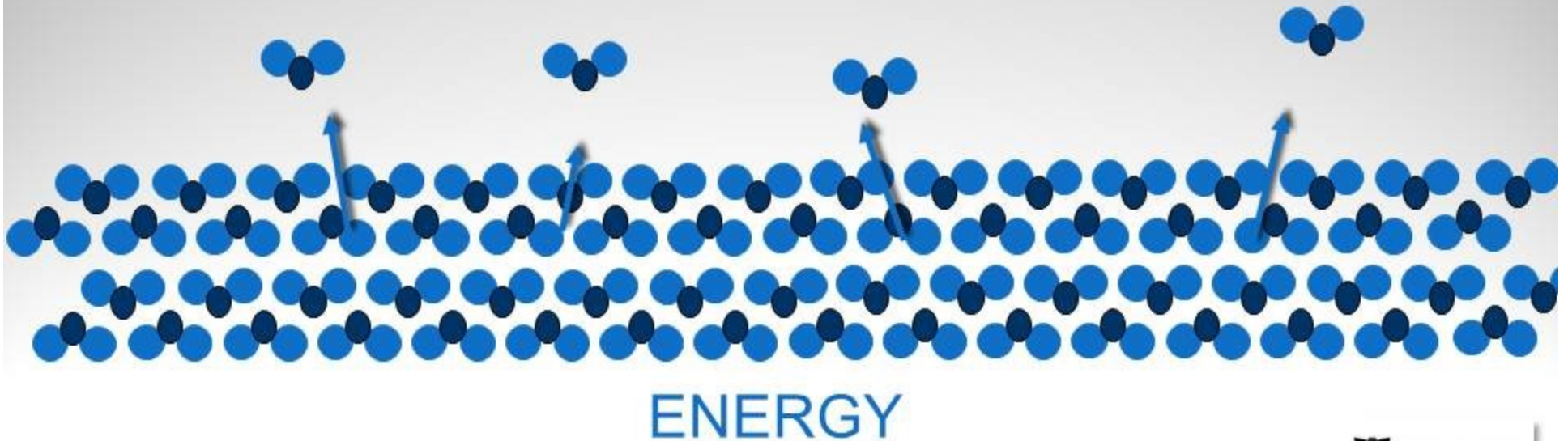


- Air Temperature
- Water Temperature
- Humidity
- Air Movement
- Water movement (fountains, waterfalls, etc.)

Actually, there is no “normal” rate of water loss for a pool. Water loss due to evaporation is dependent on a number of different variables that will change from pool to pool, and even from day to day in the same pool. It is not acceptable to say that any water loss over  $\frac{1}{4}$ ” per day is the result of a leak.

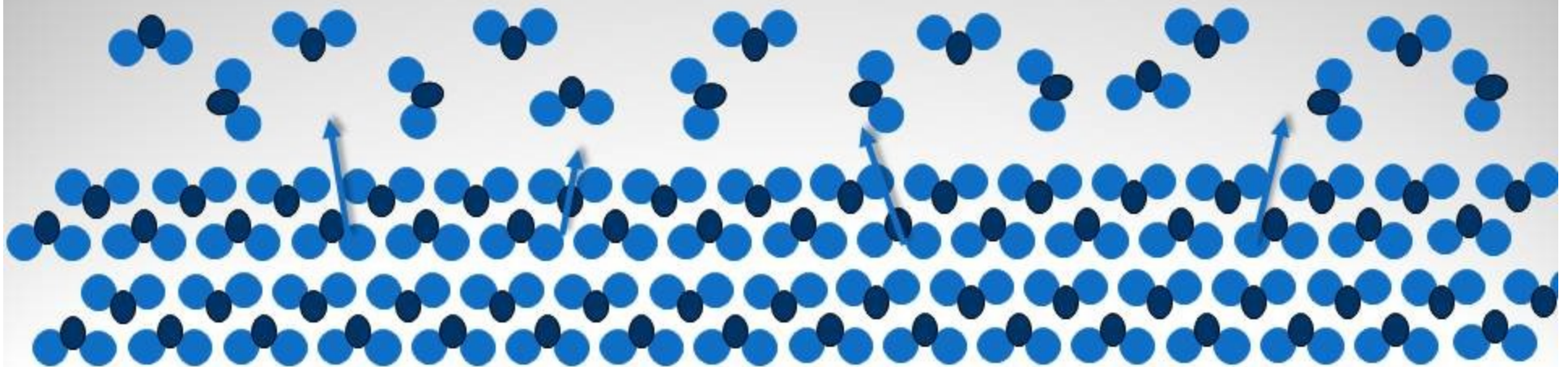
# Evaporation

The water in a pool is made up of many, many molecules held together by low level electromagnetic bonds. Energy, (water temperature) causes these molecules to move. The more they move the more of them will escape from the bonds with each other and “evaporate” into the air. This evaporation increases when the water temperature is higher in relation to the air.



# Evaporation

As the water molecules escape, they form a layer of very humid air over the top of the water. This layer in effect creates a blanket, that if not disturbed will eventually slow the level of evaporation.



ENERGY



# Evaporation

Wind, which ends up being the biggest contributor to the evaporation rate, blows these molecules away, making room for more to evaporate. In addition to blowing away the high humidity "blanket," wind will also blow molecules right off the surface of the pool. On a windy day a pool can lose as much as  $\frac{1}{2}$ " or more to evaporation.

*WIND*

*WIND*

ENERGY

# Evaporation

For more information on how different weather conditions effect evaporation, and a tool that provides an estimate of evaporation rate based on your current weather conditions go to our website at <https://www.leaktools.com/evaporation-index.html>. Information here will be automatically calculated based upon current weather conditions in your area.

*WIND*

*WIND*

ENERGY



# The Bucket Test



1. Fill pool to normal level
2. Turn off auto fill devices
3. Place filled bucket in pool
4. Mark water level in each

The bucket test provides a good estimate of how much water is being lost to evaporation.

The test involves exposing water in a bucket to the exact same environmental conditions as those affecting the pool, and then comparing the amount of water lost in each. This is a simple test that can be done by the pool owner.



# The Bucket Test



1. Fill pool to normal level
2. Turn off auto fill devices
3. Place filled bucket in pool
4. Mark water level in each
5. Measure water loss in each after 24 hours of normal operation

# The Bucket Test



1. Fill pool to normal level
2. Turn off auto fill devices
3. Place filled bucket in pool
4. Mark water level in each
5. Measure water loss in each after 24 hours of normal operation
6. Compare

Since the bucket only loses water to evaporation, while the pool loses water to both evaporation and any leaks, a pool water loss of more than the bucket is indicative of a leak.

# How Much is it Losing?

Loss in excess of evaporation (in inches)

X

.62 Gallons per inch per square foot

X

Pool Surface (in square feet)

=

Gallons of water lost

The equation shown above takes the water loss information collected during the Bucket Test and translates it into gallons.

The reason that it is preferable to describe leaks in gallons rather than inches of water lost is that the same water drop in different sized pools can be the result of very different sized leaks. A ½" water loss in a spa is the result of a much different leak than that which causes ½" loss in an Olympic sized swimming pool. If leaks are measured, described, and compared in gallons a much more accurate picture of the leak size is possible.



A 20' x 40' foot pool lost 3/4" of water in 24 hours while a bucket placed in the pool lost 1/4" in the same period.  
How much water is being lost to leak(s)?

$$(.75-.25) \quad \times \quad .62 \quad \times \quad (20 \times 40) \quad = \quad 248 \text{ Gallons}$$

Water loss  
in excess of  
evaporation

Volume of  
1inch x 1foot  
(Gallons)      2

Surface  
area of  
pool



The increased accuracy that comes from describing leaks by gallons instead of inches is valuable for several reasons. First, this increased accuracy allows for meaningful comparisons of one leak to another.

There is often more than one leak in a pool. If the first one found isn't big enough to account for the gallons being lost, more searching is required.

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How much water is being lost to leak(s)?

$$(.75-.25) \times .62 \times (20 \times 40) = 248 \text{ Gallons}$$

Water loss  
in excess of  
evaporation

Volume of  
1inch x 1foot 2  
(Gallons)

Surface  
area of  
pool



Secondly, describing leaks in this way is valuable in communications with the customer.

Gallons of water loss can be easily translated into the costs of the problem. Calculations of water replacement, resulting chemical costs, and the visualization of the structural damage and soil erosion resulting from the leak are often valuable in convincing a customer that the problem is worth getting fixed.

# Pump On/Pump Off Test

Compare water loss with pump on  
to that with pump turned off.

ON > OFF

Suspect Pressure Side Plumbing

ON < OFF

Suspect Suction Side Plumbing

ON = OFF

Suspect Pool Structure

The Pump On Pump Off Test is a modification of the Bucket test that gives an indication of what part of the pool is leaking.

If the Bucket Test was done with the pool operating under normal conditions (pump running), a second Bucket Test with the pump turned off should now be performed. Of course, the pool should be filled to it's operating level again before this second test, and the water loss measurements for each test should represent the same period of time.



# Pump On/Pump Off Test

Compare water loss with pump on  
to that with pump turned off.

ON > OFF

Suspect Pressure Side Plumbing

ON < OFF

Suspect Suction Side Plumbing

ON = OFF

Suspect Pool Structure

If the pool loses more water with the pump on than with the pump off suspect a pressure side plumbing leak (return or cleaner lines). These lines will lose more water when the plumbing is under pressure. If the pool loses more with the pump off than with the pump on, then suspect the suction plumbing (skimmer or main drain lines). These lines are actually under a vacuum when the pump is running and they may not lose water unless the pump is off. A structural leak will lose the same amount of water whether the pump is on or off.

# Pump On/Pump Off Test

Compare water loss with pump on  
to that with pump turned off.

ON > OFF

Suspect Pressure Side Plumbing

ON < OFF

Suspect Suction Side Plumbing

ON = OFF

Suspect Pool Structure

It is important to note that, although these tests give us a very good idea about where we will find the problem, any test that uses water loss measurements over a period of as long as 24 hours gives suspicions at best. While this information is helpful, don't invest too much time in getting it. If the customer can do it, that's great. It is not recommended that you invest several trips to the pool collecting this type of information yourself. A Pressure Test, (described in the Isolation section of this presentation) will give the same information with a much higher level of certainty.

# LZ400 – Water Loss Sensor

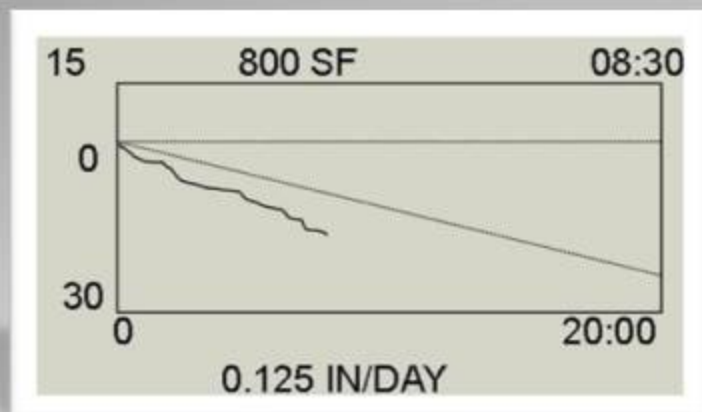


- Measures water level changes to 1/10,000 of an inch
- Enables water loss of less than 1/4" per day to be detected in minutes

While all of the previous tests discussed require a period of 24 hours between water level measurements, The LZ400 enables the same data to be collected in minutes. The effect of pool water motion and waves are minimized through sophisticated mechanical and mathematical means. The collected data is displayed on an easy to read LCD screen.



# LZ400 – Water Loss Sensor



- Graph displays water loss over time
- Detail screen calculates water loss rates in inches and gallons per hour or day

15	800 SF	08:30
TOTAL	IN/DAY	GAL/DAY
	0.240	119.05
EVAP	0.125	62.32
LEAK	0.115	56.72

By graphing this very miniscule water loss over time it is possible to see a slope that represents the rate of loss in the pool. This slope can then be compared to a reference line representing a known rate of water loss (like the lighter diagonal line above that represents .125" per day). The LZ400 also provides an estimate of actual inches, or gallons of water loss per day based on pool size data entered at the start of the test. For more info on the LZ400 [click here](#).

# Other Observations



- Any visible leaks at equipment
- Leaky backwash valve
- Air in pump or blown into pool
- Signs of deck movement
- Mushy spots in lawn
- Signs of water damage
- Other

Previously collected information is enough to warrant a trip to the pool. Before pulling out equipment to be used for the next steps however, careful observations at the pool can provide many clues that may not have been collectable through conversations with the pool owner.

# Observations at Pool



Look for water or evidence of such around fittings at the equipment.

- Any visible leaks at equipment
- Leaky backwash valve
- Air in pump or blown into pool
- Signs of deck movement
- Mushy spots in lawn
- Signs of water damage
- Other



# Observations at Pool



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- Other



Look for water or evidence of such around fittings at the equipment.

# Observations at Pool



Check to be sure that water is not being lost to waste through a leaky or incorrectly positioned backwash valve.

- Any visible leaks at equipment
- Leaky backwash valve
- Air in pump or blown into pool
- Signs of deck movement
- Mushy spots in lawn
- Signs of water damage
- Other



# Observations at Pool

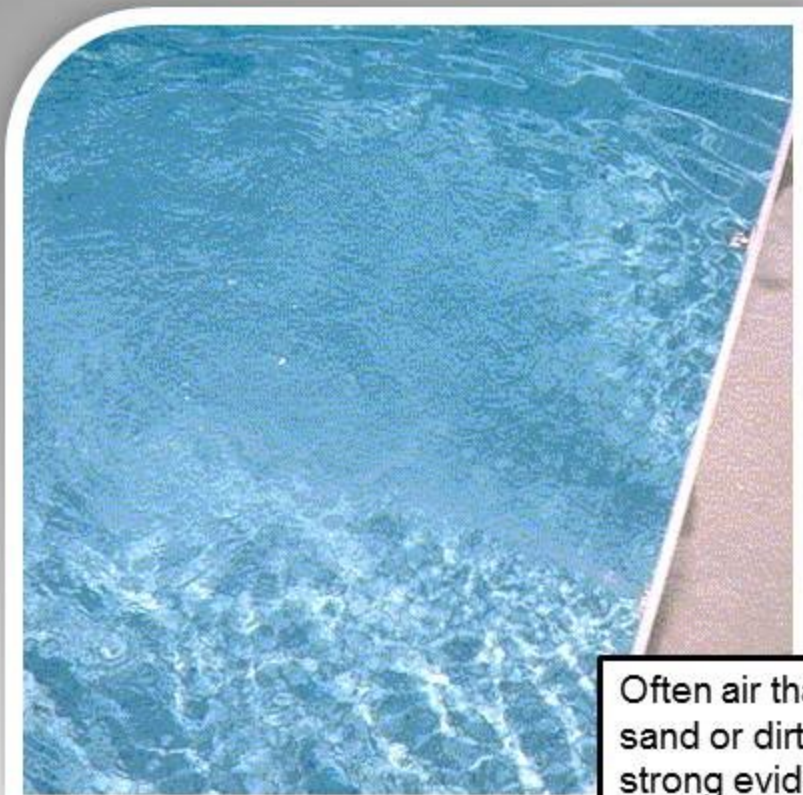


- Any visible leaks at equipment
- Leaky backwash valve
- Air in pump or blown into pool
- Signs of deck movement
- Mushy spots in lawn
- Signs of water damage
- Other

If air is evident in the pump try pouring water over exposed fittings while the pump is operating. This often causes the leaking fitting to stop pulling air, temporarily eliminating the evidence of air in the pump.



# Observations at Pool



- Any visible leaks at equipment
- Leaky backwash valve
- Air in pump or blown into pool
- Signs of deck movement
- Mushy spots in lawn
- Signs of water damage
- Other

Often air that is blown into the pool is partnered with sand or dirt that collects below the returns. This is strong evidence of an underground suction side plumbing leak.

# Observations at Pool



- Any visible leaks at equipment
- Leaky backwash valve
- Air in pump or blown into pool
- Signs of deck movement
- Mushy spots in lawn
- Signs of water damage
- Other

Keep your eyes open for any clues that may help to identify the cause or location of the suspected leak.

This picture shows evidence of a previous hole through the deck where a return line was repaired at the 90. This location or other return 90's would be suspect.