



PO Box 6391
Los Osos, CA 93412
Office: (805) 316-0640
Email: STMutualWater@gmail.com
Web: www.ST-Water.com

Water Leak Trouble Shooting for Customer Services

Public Water System Number: 4000523

1. Subject

This document describes the standard water service and household plumbing used in coastal California. Procedures are provided which can allow a trained person to check for water leaks in the three major parts of typical household plumbing; the service line, the indoor plumbing, and the outdoor plumbing. In a system with standard plumbing, a trained person can use these procedures for determining the general location of water leaks without entering the house.

2. Revision Control

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4. A word about leaks and looking for leaks.

A homeowner, or the water company, usually identifies a leak when data indicates that there is a continuous flow of water through the point-of-sale water meter during each one-hour period for 24 or more consecutive one-hour periods.

It is natural for a person to begin leak trouble shooting by guessing the location of the leak based on past experiences, and visually checking those locations.

The pressure drop test techniques described in this paper can allow a trained person to quickly determine if a water leak exists in one or more of the three areas of household plumbing; (A) the service line, (B) the indoor plumbing, and/or (C) the outdoor plumbing. In a system with standard plumbing, a trained person can use the procedures described here for determining the general location of water leaks within 15 minutes, without entering the house.

5. Definitions for water potable water plumbing

Water is available from S&T water mains that are buried under the street. A water service line conveys the water from the water main to the user point-of-entry at the residence or place of business.

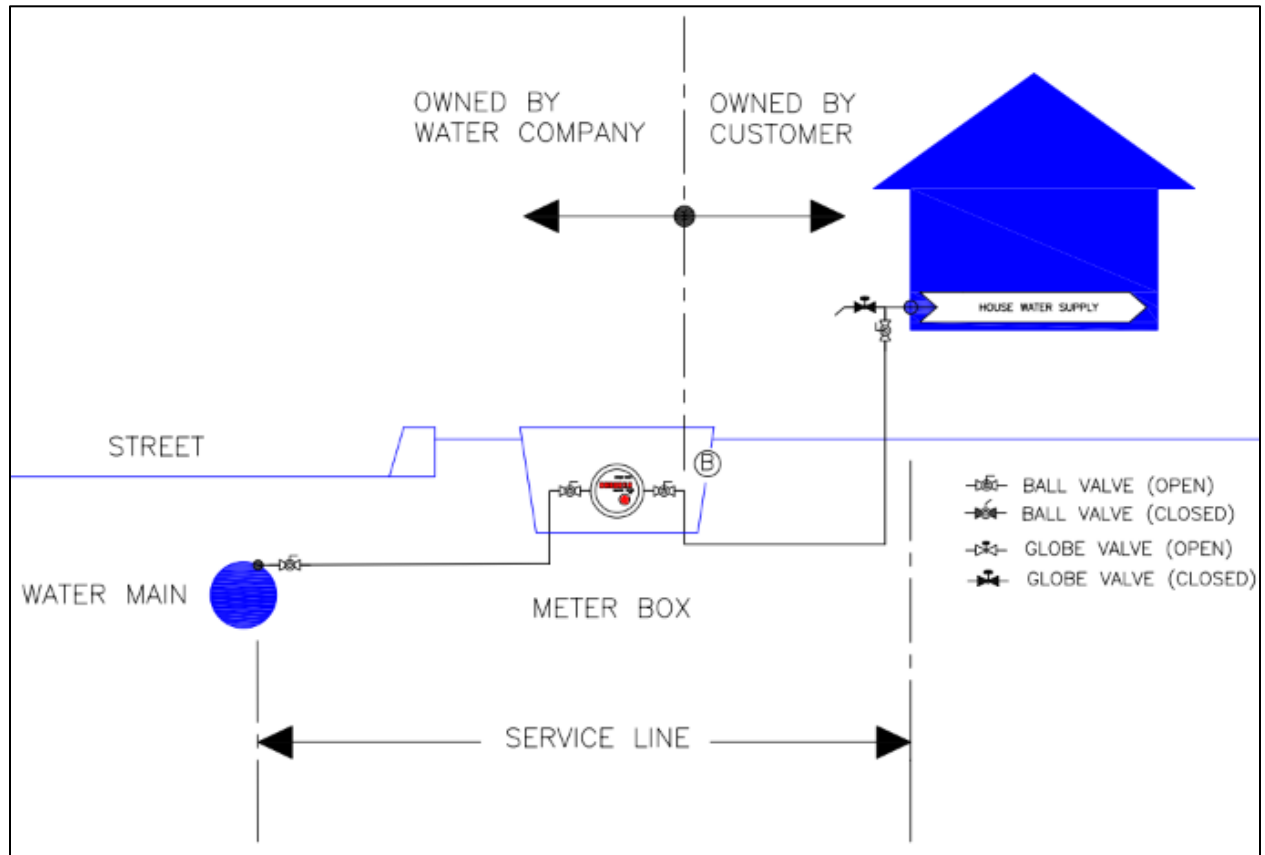


Figure 1: Diagram defining the service line

The portion of the service line, including the meter box and meter box components, upstream from the water main meter discharge ball valve outlet (B) toward the water main is owned and maintained by the water company, including the meter box and all the hardware in the meter box. The customer owned portion of the service line is located downstream from the meter discharge ball valve outlet (B) toward the customer's property is owned and maintained by the customer.

6. Water leak trouble shooting basics.

Pressure drop tests

A pressure drop test is sometimes also called a pressure decay test. This type of testing is used to test an assembly of pipes and valves for leaks. The general procedure for conducting a pressure drop test is simple:

1. Trap pressure in an assembly of pipes and valves and monitor the pressure in that assembly.
2. If the pressure in the assembly drops over time, there is a leak somewhere in that assembly.

It is also possible to conduct a pressure drop test using a water meter using this procedure:

1. Trap pressure in an assembly of pipes and valves by blocking off the pressure supply to that piping assembly.
2. Wait for a period of time to allow any leaks in that the pressurized pipe assembly to reduce the water volume (and pressure) trapped in that assembly.
3. Then, open the water pressure supply to the assembly to determine if water flows from the supply into the assembly to replace water that had leaked out.

General plan for water leak trouble shooting.

Residential plumbing consists of three basic piping assemblies (Please refer to Figure 2):

- A. The customer owned service line pipe that exists between the utility owned water meter and the household service entry shutoff valve.
 - a. There is typically a branch line in this customer owned service line pipe for providing water service to outdoor plumbing. A well-designed outdoor plumbing system will have an additional shut off valve for isolating the outdoor plumbing from the service line.
- B. The interior household plumbing.
- C. The exterior irrigation system plumbing.

A systematic approach to water leak trouble shooting should first determine if there is a leak present in the customer service line. Then, the trouble shooter can proceed to check the interior household plumbing for the presence of a leak, and then the outdoor plumbing system for the presence of a leak. It is important to understand that I am only suggesting that this search is for the presence of leaks.

I am not suggesting that the trouble shooter should attempt to determine the precise location or fault that resulted in any leaks. This procedure described here is for finding areas of the customer plumbing that do not have leaks, and for determining that areas that do have leaks.

7. Check the service line for leaks using the water meter.

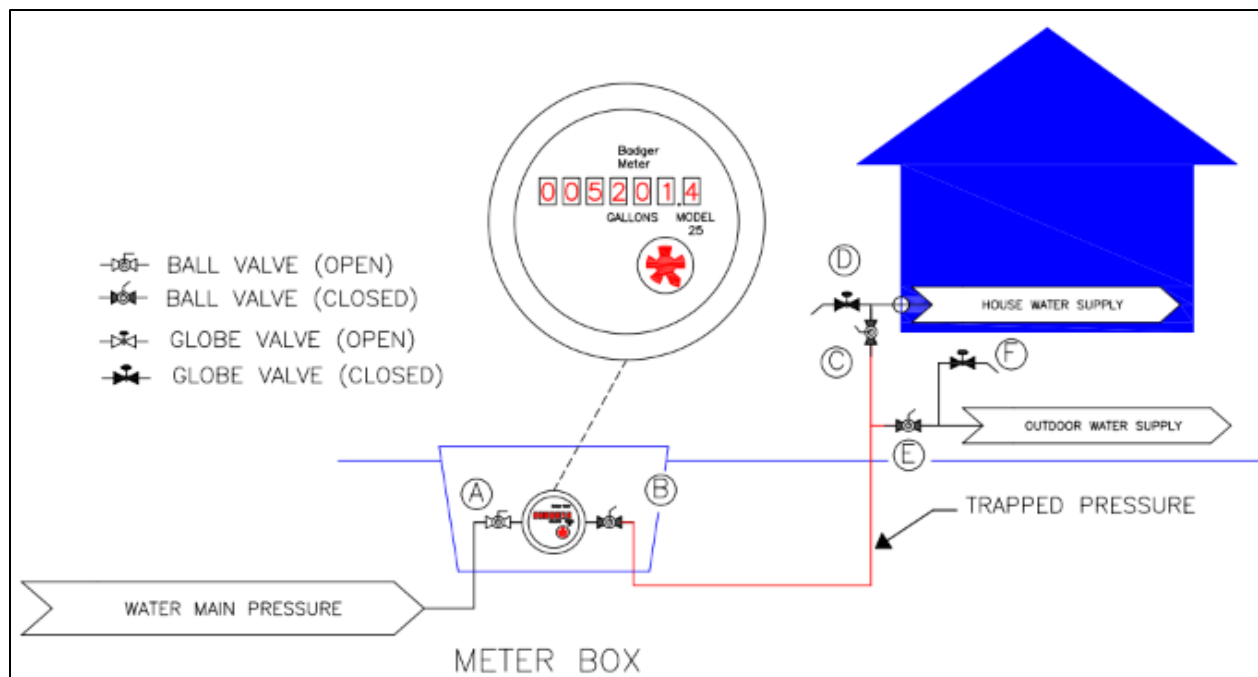


Figure 2: Water pressure is trapped in the customer service line by closing valves (B), (C), and (E). Trapped pressure is indicated by the red pipe color

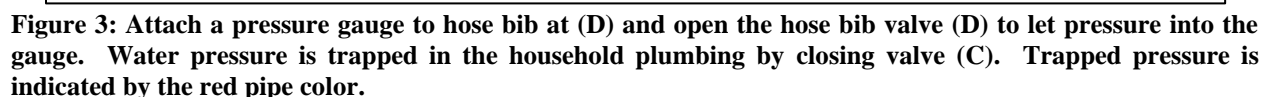
Using the example in Figure 2 as a guide, test the customer's service line for leaks.

1. Close the house shutoff valve (C).
2. Close the outdoor water supply valve (E).

Water pressure from the main line is now "dead headed", or "bottled up", between the mainline supply and the two closed valves (C) and (E).

3. Now, close the water meter discharge valve (B).
4. Start a stopwatch or write down the time.
5. Wait for a measured time (start by waiting for 5 minutes).
6. At the end of the wait time, slowly open the meter discharge valve (B) while watching the meter for any indication that water flows into the trapped volume.

If the meter indicates there was no flow when valve (B) was opened, there **IS NOT** a leak in that trapped pipe volume. If the meter indicates a flow of water when valve (B) was opened, there **IS** a leak in that trapped volume that will need to be found and repaired.



1. Ask the customer to stop using water inside the house before conducting the leak test.
2. Install a pressure gauge on the hose bib at location (D)
3. Open the hose bib valve (D) to allow water pressure into the pressure gauge. Verify that the pressure gauge now indicates water main pressure.
4. Close the water service valve (C) to trap pressure in the household plumbing.
5. If the pressure indication of the pressure gauge begins to drop when valve (C) is closed, this indicates that water is leaking somewhere in the household plumbing.
6. If the pressure in the gauge maintains a steady indication of water main pressure, this indicates that **there is NOT a leak** in the pressurized plumbing inside the house.
 - a. Be aware that a slow toilet flapper valve leak might only trigger a pressure drop after the toilet tank reservoir drops to the re-fill level. This type of leak may allow the pressure gauge to measure a steady pressure for 15 minutes or longer before the gauge indication suddenly drops to zero pressure when the toilet tank refills.

The diagram illustrates the correct installation of a water meter. A legend at the top left defines the valve symbols:

- Ball Valve (Open): Two parallel lines.
- Ball Valve (Closed): Two parallel lines with a perpendicular bar across them.
- Globe Valve (Open): Two circles with a line connecting them.
- Globe Valve (Closed): Two circles with a perpendicular bar across the connecting line.

 The main components and connections are:

- Water Main Pressure:** Represented by a purple arrow pointing into the meter box from the left.
- Meter Box:** A blue trapezoidal enclosure containing the water meter. It has two ports, A and B, both equipped with ball valves.
- Trapped Pressure:** A red line connects the pressure gauge to the space between the meter and the house supply, indicating the pressure is trapped when the house valve is closed.
- House Water Supply:** A blue arrow pointing into the house from the meter box. It is controlled by a globe valve (D) and a ball valve (C).
- Outdoor Water Supply:** A blue arrow pointing away from the meter box. It is controlled by a ball valve (E) and a globe valve (F).

 The pressure gauge is positioned to measure the pressure in the trapped space between the meter and the house supply.

Using the example in Figure 4 as a guide, test the customer's outdoor plumbing for leaks.

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10. Characterization of water leak flows

The following table was developed by S&T MWC as an aid in characterizing the size of various water leak flows and the potential for unnecessary waste and cost.

Continuous leak flow rate in gallons per hour (gph)	Continuous leak flow rate (gpm)	Daily leak flow (gal / day)	Leak flow for metering period (gal / 60 days)	Notes
0	0	0	0	Median water use without leaks
0.4	0.007	10	576	100 drips per minute (approx)
0.6	0.01	14	864	
1.0	0.02	24	1,440	Badger Leak flag definition for continuous flow during 24 hours
1.2	0.02	29	1,728	Drips become steady stream (approx)
2.0	0.03	48	2,880	
4.0	0.07	96	5,760	
6.0	0.10	144	8,640	
8.0	0.13	192	11,520	
10.0	0.17	240	14,400	
15.0	0.25	360	21,600	
20.0	0.33	480	28,800	
30.0	0.50	720	43,200	
40.0	0.67	960	57,600	
50.0	0.83	1,200	72,000	
60.0	1	1,440	86,400	
120.0	2	2,880	172,800	
180.0	3	4,320	259,200	
240.0	4	5,760	345,600	
300.0	5	7,200	432,000	
360.0	6	8,640	518,400	
420.0	7	10,080	604,800	
480.0	8	11,520	691,200	1/4 inch diameter leak with 50 psi back pressure (approx)
540.0	9	12,960	777,600	
600.0	10	14,400	864,000	Beginning of range for flow of garden hose or irrigation pipe at 50 psig depending upon hose/pipe diameter and length
660.0	11	15,840	950,400	
720.0	12	17,280	1,036,800	