

HOW TO INSPECT POOLS & SPAS



INTRODUCTION

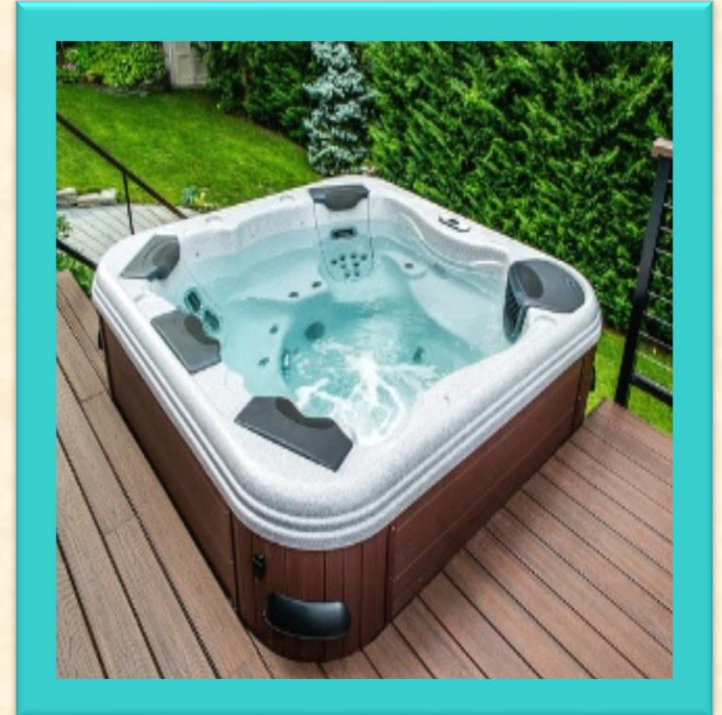
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THE PROGRAM'S FOCUS

In this program you will learn accurate and useful information for home inspectors to perform an inspection of pools and spas at residential properties. Here's what you'll learn in this module:

- Pool safety
- Pools and spas – what's the difference?
- The specifics of pool maintenance
- The techniques for adding chlorine
- Pool plumbing
- Pool drains



SAFETY ALWAYS COMES FIRST

- Water and electricity don't mix. Consult or hire an electrician instead of doing any electrical work. Electricity can kill.
- Always proceed with caution, and use personal protection equipment.
- Be aware of your surroundings when performing an inspection, especially when there are electrical components and water in close proximity to each other.
- Never grab wires or components without disconnecting them from their power source.
- Wear rubber-soled shoes and rubber gloves.



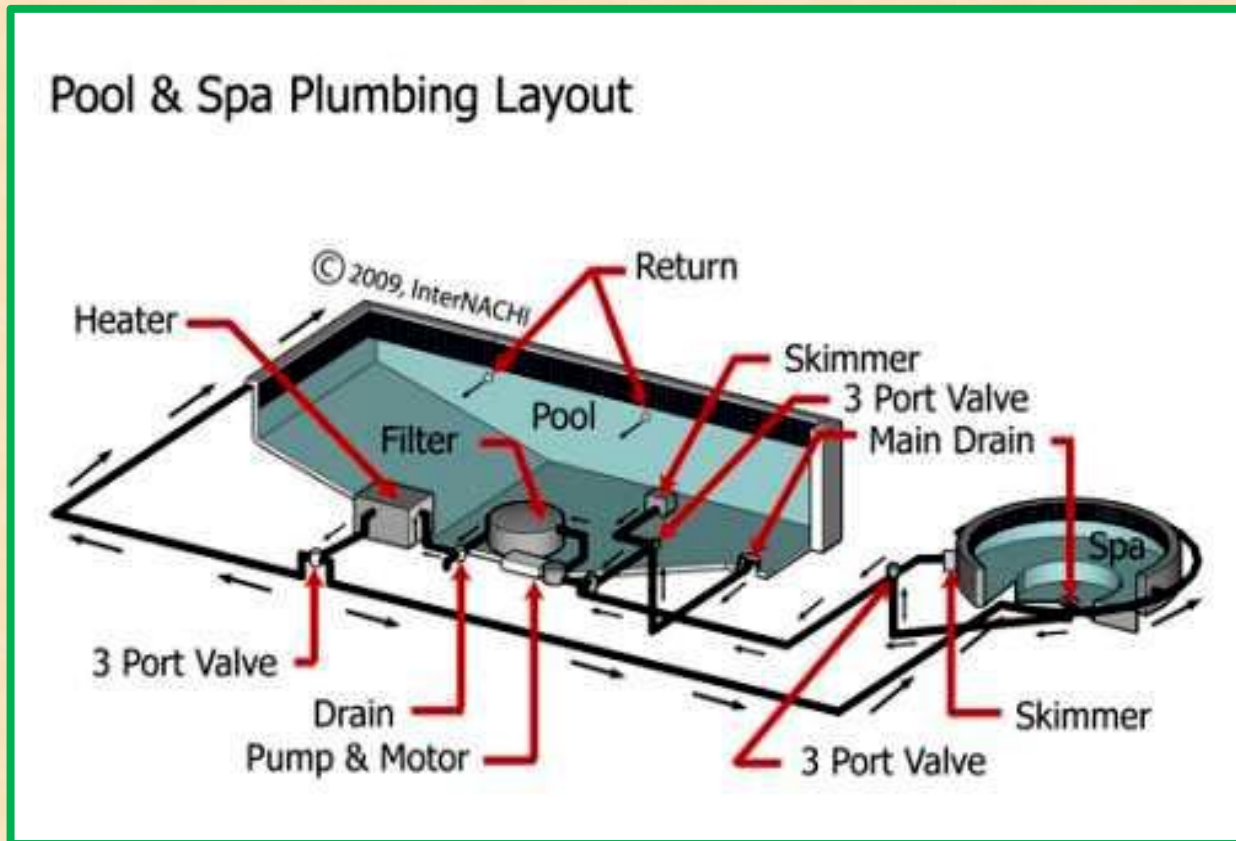
SAFETY FIRST – PART 2

- Don't stand in water when working with or inspecting equipment. Be sure to identify all circuits related to the pool equipment.
- When inspecting the pool or spa, check for unfinished or poor workmanship, particularly with electrical components, wiring and installation.
- Check grounding wire connections, loose wires and conduits, and water leaks. Remember that water is an effective conductor of electricity. If there is an electrical problem with the pool equipment, a fault could occur and charge the entire pool or spa, making it fatally hazardous. Be careful.



THE BASICS

In this section we'll focus on the basics of pool and spa construction.



POOL OR SPA: WHAT'S THE DIFFERENCE?

Here are the working definitions:

For purposes of this guide, a swimming pool is considered a permanent structure in the ground, or partially in the ground, that is capable of holding water with a depth greater than 42 inches outside a building, as well as all pools installed inside a building without regard to water depth.

The terms “spa” and “hot tub” are used here interchangeably. A spa or hot tub is a hydro-massage pool or tub used for recreational or therapeutic use, not located in a healthcare facility. They typically use a filter, heater and motor-driven blower. A hot tub is usually built with wood. A spa is usually made with fiberglass.

MAINTAIN & SERVICE A SQUARE OR RECTANGULAR SHAPE

- The volume of the water, in gallons, inside a pool or spa equals the length multiplied by the width multiplied by the average depth multiplied by 7.5, like this:

Volume (gallons) = length x width x average depth x 7.5.

- To determine the volume, you could measure the length of the rectangular pool, then measure the width, and then the depth of the pool. That will give you the volume in cubic feet of water.
- Since there are 7.5 gallons of water in 1 cubic foot of water, multiply the volume by 7.5 to get the volume expressed in gallons



CIRCULAR POOLS OR SPAS

- If the container is circular, then use the following equation to determine the volume of water in the container:
- $\pi \times r^2 \times \text{average depth} \times 7.5 = \text{volume in gallons}$.
- Pi (π) is a mathematical constant that equals 3.14.
- The “r” is the radius. The radius is the measurement that is one-half of the diameter of the circle. The diameter is the straight line across the middle of the circle.
- Radius² is simply the radius multiplied by itself (radius x radius = radius²). If you want to measure in liters, then use 1,000 instead of 7.5.
- For example, if the hot tub is 6 feet across the middle, which is its diameter, the radius is 3 feet. Radius² equals 9 (3 x 3).

IRREGULAR SHAPES

- If the pool or spa is irregular in shape, then you'll have to do some additional calculations and adding of parts.
- You have to imagine the pool or spa as a combination of smaller, regular shapes.
- Measure those areas, make your volume calculations for each, then add them all together.



USING CHEMICALS

- When it comes to calculating the addition of chemicals to a pool or spa, how much chemicals are added to the pool or spa, you need to understand the term “parts per million,” or ppm.
- Parts-per is used when measuring the amount of solids that exist in a liquid.
- So, “1 ppm” means one part mixed with a million parts.



ADDING CHLORINE

When it comes to adding chlorine to a pool or spa, there's much more to know.

- Three parts of chlorine that exist in every 1 million parts of water can be expressed as 3 ppm. However, 3 gallons of chlorine chemicals added to 1 million gallons of pool water does not translate as 3 ppm.
- That is because the two are not the same. Chlorine liquid does not have the same density as pool water. Chlorine liquid, which weighs 10 pounds per gallon, is heavier than pool water, which weighs 8.3 pounds per gallon.
- Chlorine is denser than water. There's actually more of it relative to an equal volume of water.



MORE ON CHLORINE

- To add chlorine to a pool of water, you first have to translate the amounts of the two liquids so that they're expressed as pounds. You have to express the amount of chlorine in pounds, and the amount of water in pounds.
- One gallon of chlorine weighs 10 pounds. One gallon of water weighs 8.3 pounds. That must be translated to parts of chlorine per 1 million parts of water.
- A bucket of chlorine comes in a 10% to 15% solution, meaning that 10% to 15% of what comes out of the bucket or bottle is chlorine, and the rest is inert ingredients or filler.
- One must measure the volume of the pool or spa and the amount of chemicals being added to the water.
- By the way, 1 part per trillion (1 ppt) is a proportion equivalent to 1/20 of a drop of water diluted into a 2-meter-deep, Olympic-size swimming pool.

TYPES OF POOLS

- Wood
- Fiberglass
- Concrete
- Above-Ground
- Vinyl-Lined



A fiberglass pool

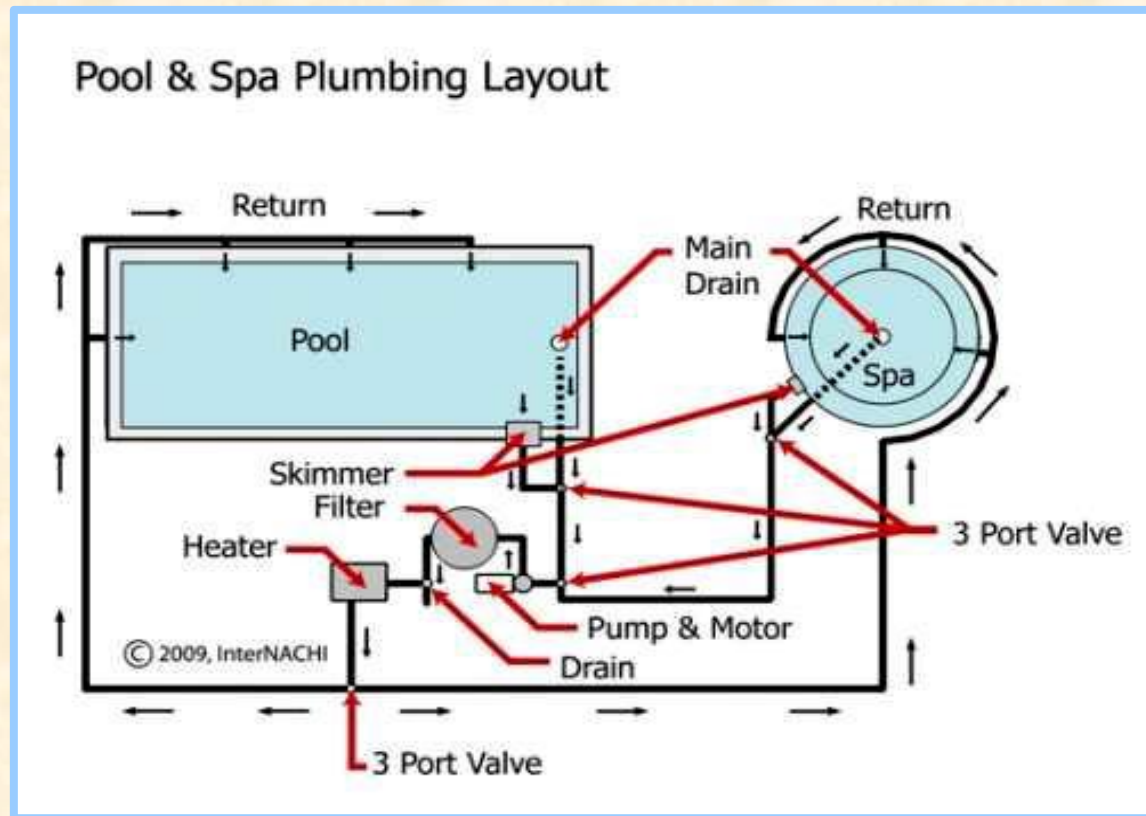
CONSTRUCTION: STEP BY STEP

Spas or hot tubs are usually installed as 1 complete unit. But pools are built one step at a time. See the construction images below.



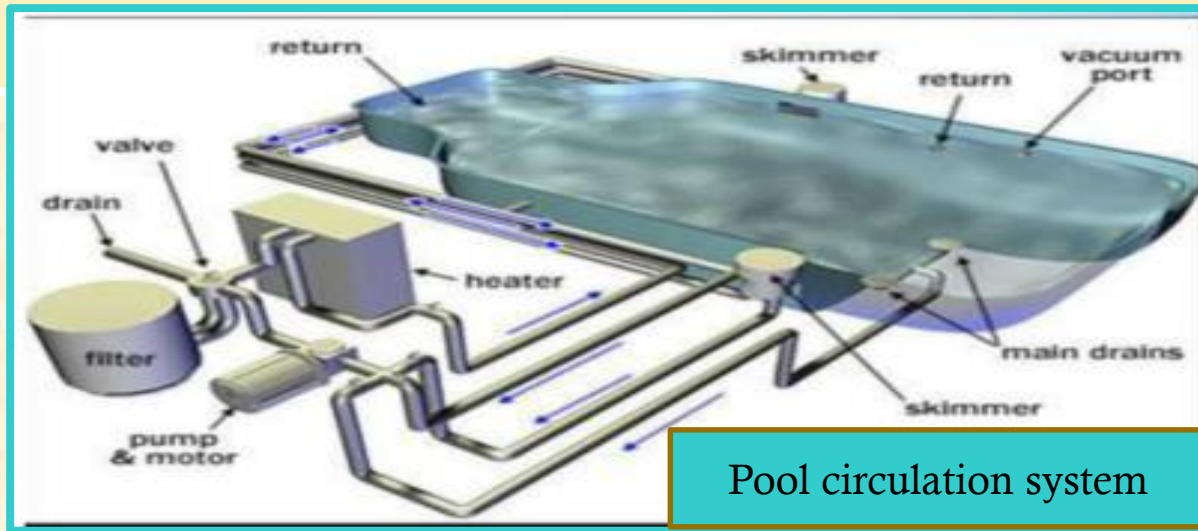
POOL PLUMBING

To understand how a pool or spa works, you can follow the path that the water takes in a pool or spa system. Study the design image below.



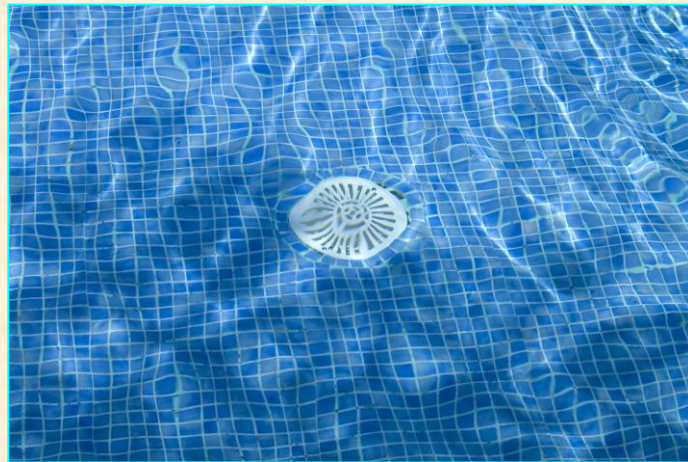
THE CIRCULATION SYSTEM

- The circulation system is generally one of two designs: direct suction or overflow. Direct suction means the pump is sucking water from the main drain and/or return outlets.
- Overflow means that there's a displacement of water from bathers that is caught in the gutter, skimmer systems, or collection tank.
- Overflow systems typically incorporate a gutter system at a commercial pool installation.



THE MAIN DRAIN

- The main drain (and some pools or spas might have more than 1), which is located on the pool floor, might have a special hydrostatic port.
- This type of port is a one-way port that allows water that collects underneath the pool floor to enter the drain, which prevents water from leaking out of the pool.
- If water collects underneath a pool, extreme upward pressure may be created that could crack the pool. This pressure is called hydrostatic pressure.
- There should be no changes to the main drain's size or location unless it is evaluated by the engineer or pool expert who designed the installation.



MORE ABOUT DRAINS...

- If one drain is clogged or blocked by a hand or foot, the other will be open and water can be pulled from that drain instead. This helps prevent injuring the person blocking the main drain.
- If the main drain is located on a pool floor that is very deep, this safety suction line might not be necessary. All pools should have a balance of suction at the main drain and the skimmer to prevent injuring someone who might be blocking a port.
- Drains which have a whirlpool effect are typically located in shallow pools, and a special domed cover could be installed at the main drain to prevent this action. Otherwise, the main drain at the deep end of the pool will have a grate installed on it.
- The cover might be flat with grated openings. The drain is usually 6 to 12 inches in diameter.
- The main drain should be visually inspected regularly (ideally, daily), particularly when the pool is being serviced or being swept.
- There shouldn't be any damage, clogging or cracks at the drain cover. It is important to minimize the flow through the main drain to prevent entrapment problems. Local codes regulate the water flow-rates through the system

END OF MODULE 1

This is the end of Module 1. Please, proceed to the 10-question quiz. Once you have completed that, you may proceed to Module 2.

