Spring Maintenance - Visual Inspection of your cooling system, for Homeowners and Buyers

[Intro Music]

Host: Wow winter is almost over, done and gone. It's time to do visual checks on systems needed for the warmer months. Hello and welcome to EBC Home Hints, the podcast dedicated to making your home a safer place, one episode at a time. I'm your host, Paul Rochette, and today we're diving into the world of doing a visual inspection of your air system before the first heat. Let's roll into Spring!

Host Part 1

This podcast will go over the process of visually inspecting your cooling system. The most prevalent systems in the U.S. today, are the heat pumps or air conditioners paired with a furnace, and air handler. Today, I'll be discussing the air conditioners paired with furnaces. I'll refer to them as the forced air system from here on. Let's describe the look and sounds of these systems, so you can do some of the visual checks yourself.

While listening, try to put yourself in the 1920's when radio was all we had. Try to visualize the areas and components of this system. I'll first describe how to identify the components, then what to look and listen for during your visual inspection.

Remember, this is for one type of system and may not apply to you. Let's begin outside. **(PAUSE 1:38.500)** Hopefully, it's not raining, **(PAUSE 1:41.620)** locate a **large** metal box called the condenser unit either on the side, or rear of your home. You will notice it is on a base, either metal, or cement. The top of the condenser unit has a built-in fan with a protective wire cage over it. Behind the vented metal cabinet are aluminum fins. They are on the sides of the system, behind ventilated covers. You will see a small copper line and a wrapped larger copper line exiting the condenser unit, then entering the home. A large, covered power line will come out of the condenser unit to a small box normally grey metal. The size will vary, but normally it is 2.5" deep by 5 inches wide and 9 inches high and called a disconnect box.

Special note: If your main service panel, for the home, is outside and in view of the condenser unit, you may not have a disconnect box. For the outside power service panel, the AC breaker is installed, becoming the disconnect.

Hopefully, you can visualize this portion of the cooling system outside. Now let's move inside. Look for the inside part of the system, referred to as the distribution system. The combination of air and heat is called the forced air system. Usually this is in a crawlspace, basement, closet, or utility room. The hunt begins. **(Sound 3:08.418)** To help you locate it, recall when outside, I indicated that two copper lines went into the home. Did it go in just above the ground, or climb the exterior of the home? Well, if it is just above the ground, it's likely to be in the crawl space, basement, or closet so look there. Otherwise, if the line is running up the house, it is probably in the attic.

(PAUSE 3:33.060) Wow, you found it. **(Tada3:34.060)** For the system we are discussing, you will see a rectangular unit, either on its side, or upright. You should see the two copper lines, one insulated, going into an insulated metal box, called the plenum. You will see plastic piping exiting the plenum either emptying into a drain, or small pump like motor. The plenum is how the air exits the system to the home, through what are called air ducts. The ducts can be made of metal tubes, or a flexible coil tube.

Moving down away from the plenum, you will see larger rectangular duct work. Either rectangular metal, or round flexible tubing. This is called the air return that brings air from inside the home, back into the unit. Just before the air returns entering the distribution system, you will see something like a box, between the air return duct to the distribution system. This is where your filter is located for the system. Filters come in many different sizes and types. We are only going to discuss paper filters. They come 1–5-inch sizes. The smaller 1-inch filters may be in a small slot, inside the duct work. Normally, there is a metal slide door that slides up to reveal the filter. Larger filters, normally, are in a box, with a door that pulls out.

I know this was a lot to describe, but hopefully you have identified all the parts.

Host Part 2

Now that you know what everything looks like, let's begin the visual inspection. This needs to be performed before operating the air conditioning for the first time this season. After the visual inspection, we will test the system by listening, watching and smelling for issues.

- First look at the surrounding area of the condenser unit. Is the unit on a solid pad and both the pad and unit are level? If not, you should have a service professional advice you.
- What does the surrounding earthy area look like. Depending on the ground, think about wind, trees, nettles, anything that can affect air flow. Can dirt, dust and debris get pulled into the unit? Yes, this is why it's important to keep the surrounding area of the condenser clear and open.

  Example: Say you have bare soil, and it rains. Can it splash mud and debris into the unit?

  Be aware that tall weeds and grass can affect the condensers' ability to get air. As you cut the weeds, or grass, be aware this can throw dust and cuttings into the condenser and aluminum fins.

  Why are we so concerned about this? The condenser unit behind the case has very thin aluminum fins. This allows the condenser to get air from the outside. The aluminum fins increase the surface area to dissipate heat. Heat is generated as part of the condenser cooling process.

- **(PAUSE 6:31.413)** Many manufacturers want a minimum of 12 inches around all sides. Some may want up to 36 inches. Again, the reason is that the system is more efficient when it can breathe. Before working on the condenser unit, always turn the power off. **(PAUSE 6:47.413)**
    - Safety tip. Even though this is a visual inspection, exercise caution turning the power off to the condenser unit. Just turning off the thermostat is not enough, locate the small grey disconnect, we discussed. Open the panel by pulling it out and up on the door. You will see one of the following, an actual breaker, that looks like a light switch, or most likely, you will see block with a handle. One type will have actual fuses in them. They are about the size of batteries, with metal on both ends. The most common have metal contacts in the handle, no fuses.
    - The handled pull block should be pulled out. Whereas the breaker is switched off. You will hear a click **(SOUND EFFECT 7:30.685)** when the breaker is off. Make sure you move the breaker to its full position, or it may not be fully off.
- Now either turn off the breaker or pull the power block.
    - As part of your inspection, look at the metal service plate on the side, or back of the condenser unit. First look for the MAX amp, or amperage rating and record it.

    - Next, for the Fused disconnect and breaker style, what is the amperage rating for that. Record that.
    - If the disconnect pull block has only metal tabs and no fuses, read the sticker inside the box, recording the amperage rating of the disconnect box.

What in the world are we doing all this for? Older condenser systems that were less efficient needed a much higher amperage than today's systems. When the systems are replaced, the breaker size sometimes gets missed and not replaced.

- As an example, the condenser unit has a max amp rating of 30 amps. The disconnect, whether fused, or a breaker should have a disconnect max amperage no higher than 30 amps, in this example.
- So, let's also say your breaker and fused disconnect have the correct amperage.
    - Are you ok then? Yes
- Another example: You have the same 30-amp max amp rating for the condenser unit. You have a cheaper and older disconnect that just has metal pins. Read the sticker inside the disconnect panel for max rating. Most are rated for up to 60 amps.
    - Are you ok? Might be, we have not discussed this, but it depends on the main service panels breaker size.
- Go to your main service panel. Either outside, garage, basement, or closet. It's a large panel with a metal door.

(Safety Caution Sound)

    - **(Sound effect 9:27)** Safety caution: Opening a service panel can be dangerous if improperly wired or is un-grounded. If you are unsure of the integrity and safety of the main service panel, I recommend a service professional perform this step. As a home inspector, we see so many homeowners perform their own electrical. If done incorrectly, the main service panel can become electrically charged and potentially kill you by touching it.
- Assuming you know your main service panel is safe. Open the door to the panel. Hopefully, the breaker(s) labeled as AC which is short for air conditioner. Let's say they are. You identify the AC breaker says 60 amps. Carefully close the main service panel.
    - Using this information for this scenario, we have a condenser unit of max 30-amp rating, a disconnect and main service breaker rated for 60 amps. In this situation, the condenser could become damaged or catch fire under the right power surge, or other type of failure.

    - What can be done? Have a professional evaluate; however, an appropriate change might be to replace the disconnect panel, by the condenser, to the 30-amp design. This negates changing the main service panel breaker itself.
- Second, with a flashlight, look at the aluminum fins inside and outside.

  Note: The outside has ventilation slits and may be more difficult to see through.

- Inspect the aluminum fins. Do they appear crushed, or extremely dirty, are there leaves, sticks etc. inside the casing? These issues should be corrected by a service professional.
- Fourth, **(ALERT SOUND 11:16)** DO NOT TOUCH, look to make sure all electrical wires exiting the condenser unit have something protecting the wire. The power line from the condenser and switch panel, outside home, should be a wrapped material, usually grey, with a bundle of wires inside.
    - The wire bundle should have a fitting on each end and secured in the condenser and the disconnect switch. Please make sure they are intact. Without them, any vibration can eventually cut through the power lines.
- Finally, as your visual inspection, you should see one small copper line exiting the condenser and a larger, copper line with insulation surrounding it. The larger line needs to be properly insulated from the condenser unit into the home.
    - Why? The wrapping protects the copper line and improves efficiency, by preventing the sun and heat from reducing its efficiency.

Host Part 3 (Inside unit)

(PAUSE 12:08) The second visual inspection is inside the home. The system inside, called the distribution system also known as the forced air system, provides heat and cooling throughout the home. The system's location varies. It can be in the attic, crawl space, closet, even basement.

What are you looking for:

1. Look for the two copper lines entering the home. Remember, the larger copper line must also be insulated inside. The smaller copper line will probably be attached to the other insulated copper line for protection. Follow these lines until they enter the insulated plenum box. This will be attached to the rectangular furnace system.
2. Inspect the insulation wrapping around the plenum. The entire plenum should be covered with an insulation wrap.

3. **(PAUSE 12:56)** Inside the plenum, is where the air conditioners “Evaporator coil” lives. The evaporator coil inside should be cleaned yearly, by a professional.
    a. Why get a professional? They have the proper tools to open and clean the coils.
    b. If most items should have a professional, why should the homeowner do the visual checks?
        - The best answer I can give, as a home inspector, is knowledge. Most home items that break or have issues can be minimized by knowing what to look for. Be informed and empowered. You just might save yourself a major outlay, by identifying concerns early. That is my goal, to help all homeowners and buyers understand your home.
    c. Look for moisture and any type of buildup on and around the plenum.
    d. The coil creates a lot of condensation, due to the cooling process. Look for a plastic pipe coming out of the plenum. It should run into a drain, or small pump that sends the condensate out.
    e. Unless we can see inside the plenum, the outside can tell us something too. Look for puddles, or water damage and smell for musty mildew odors around vents.

    What happens if water is not properly draining from the evaporator coil and out of the unit?

    - If excess condensate cannot exit out the plenum, this can cause water damage, coil damage, and allow bacteria the ability to grow. This can take a preventable situation and turn it into a possible health concern as well as can become something more costly.

4. Next inspect electrical
    a. Loose or damaged electrical connections can cause your system to malfunction. Visually inspect the wiring and connections. If you notice any frayed wires or signs of wear, contact a service professional to handle the repairs. Please do not touch the wiring.

5. **(PAUSE 14:50)** Inspect the duct work. You’re looking for openings, damage, crushed, or restricted ducts. These need to be taken care of. If small rips, tears, or holes are found, use heat resistant foil tape, aluminum in color.

    a. **(Emphasize)** **(PAUSE 15:03.104)** If you grab the duct tape put it down and walk away and call a service professional. You might be able to build a boat

out of duct tape, Not plumbing, electrical, or ducts. Duct tape is not electrical tape or heat resistant.

6. **(PAUSE 15:18)**Use the appropriate heat-resistant tape for supply lines and returns. I will address this in other podcasts if people would like to know more.

7. Look for a light switch, beside the forced air system. The switch is an emergency means of cutting power to the distribution system and maintenance switch. If no switch is installed, call a service professional to evaluate.

8. Check the air filter(s).
    a. You should check or replace filters every 1-3 months. This depends on the filter type, size and frankly dust in the home. Animal dander, hair "and yes, dead skin, are pulled into the system caught by the filter.
    b. A dirty filter restricts air circulation, reducing efficiency and makes the system work harder.
    c. Each home is different and can have more things in the air than others. You will get a feel for your home and when the filter needs to be replaced.
9. Final step before testing? Reconnect power to the condenser unit, making sure the disconnect panel is closed after. **(PAUSE 16:21.421)** Special note, the pull blocks can go in two ways. One side may say ON the other OFF. This is so you can store the pull block in the box. So, make sure ON is on top. Be safe.

Host Part 4

(Test the system)

(PAUSE 16:35.267) Before testing your system, follow these conditions. If the previous night was 50 degrees, or above and 60 degrees and above on the day of testing. You can perform your testing.

1) At the thermostat, set the thermostat to a temp about five degrees below its current inside temperature. This allows you to run around listening for noises, unusual sounds and smells. After the inspection, remember to reset the thermostat. **(PAUSE 17:02.826)**

The outside condenser unit as well as the distribution system will have different normal and troubling noises, looks and smells, instead of listing all of them, for each component, I will try to give you a broad outline of what is normal and concerning.

(PAUSE 17:21) What should we listen for?

- All your systems will make a variety of sounds, both good and concerning.
    - Normal sounds: Low humming sounds like the motor and fan circulating the air. Clicking and buzzing sounds faint and normal electrical sounds. Unless consistent and fast. The air blowing from the condenser is warm and normal. This is not a complete listing for everything, but a good start on understanding normal operations.
    - Concerning sounds: Listen for unusual sounds, such as clanking, loud buzzing, vibrations, drainage issues like leaks, or hissing sounds. If hissing sounds are heard, it can be a refrigerant leak. If so, oil spray might be present as well. Watch for low airflow issues in the air ducts, including holes in the duct work.
- Since it's difficult to explain, good smells; let's just discuss the bad smells. **(PAUSE 18:16.219)** No not including Uncle Fred.
    - Whether inside or outside, we are smelling for burning smells, for overheating components. We all have smelled moldy and musty smells. This can indicate potential bacteria growing within the system. Smell for fishy odors will typically indicate over heating electrical. A bigger issue is the rotten egg smell, or sulfur-like smell indicating possible gas leak. In this case I strongly recommend turning the gas off and contact a plumber. **(PAUSE 18:45.110)**

[Closing Music]

1. **(Encourage Listeners)**
    a. **Host:** "Thank you for tuning into EBC Home Hints! If you found today's episode helpful, please like and subscribe. If you want to stay updated with more tips and insights, I encourage you to visit our website at EBCInspections.com. Don't forget to follow us on social media like Apple Podcast, Spotify, Overcast, Pocket Casts, YouTube, Castro, Goodpods, Castbox, podcast addict, Facebook, Instagram, Player FM and Amazon Music for the latest updates, resources, and community discussions. Join me online and be part of our growing community dedicated to informed and empowered homeownership!"