



MONTHLY

News and Views from the Connecticut Association of Home Inspectors, Inc.

July 2005

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Know What You're Inspecting - Getting Ready For Air Conditioning

By Stan Bajerski

It's winter. It's cold. The last thing anyone is thinking about is air conditioning. But, in no time at all, home inspectors across the state will be evaluating the condition and operation of air conditioning systems. This is a good time to brush up and get prepared for the coming summer.

It still amazes me how little some home inspectors know about air conditioning and how it works. You must know and understand the "refrigeration process" before you can determine how well a system is operating. If you understand how water boils and turns to a vapor when heat is applied, and how the vapor condenses back to a liquid when heat is removed, then you have already begun to understand the refrigeration process. In a nutshell, it extracts heat from one space and dispenses it in another.

The Components

Let's start with a review of the main components that comprise all air conditioning systems. They are the cooling or evaporator coil, circulating fan, condensing coil, condenser fan, compressor, and refrigerant lines.

The cooling or evaporator coil is located on the interior portion of a window unit, in the air handler of a central air unit, or in the plenum of a warm air furnace. This coil, when used in central air system is also referred to as the A coil because of its inverted V shape. The circulating fan moves air from the space to be conditioned across the evaporator coil and back into the space. In a central air unit, it is located in the air handler. In a warm air system, it is located in the furnace.

The condensing unit is located outside and is comprised of the condensing coil, condenser fan and the compressor.

There is a small diameter refrigerant line inside the condensing unit that connects the compressor with the condensing coil. This is the hot gas line. It carries high temperature, high pressure vapor and is extremely hot to the touch. There are two lines that run from the cooling coil inside the home to the condensing unit outside the home. The smaller diameter, un-insulated line is the liquid line. This line carries condensed low pressure liquid from the condensing coil to the cooling coil. It should be body temperature. The larger diameter refrigerant line is the suction line. It is cool to the touch when the system is operating properly. It should be insulated.

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Meeting Dates

July 27 *Open Forum*

August *Vacation month -
No Meeting or
Seminars*

Sept 28 *TBA*

**Holiday Inn
201 Washington Ave
North Haven
(203) 239-6700**

President's Corner

Dwight Uffer

I hope everyone is having a prosperous summer season. It appears that the market keeps moving forward with most inspectors that I have spoken with having a very lucrative year. With rates staying on the low side and homes moving as fast as they are, it would appear that we are in for a good year.

This month's meeting, for which I hope will find a good turnout, will be an open forum in which the membership can openly speak about concerns that they may have with the Home Inspection Industry, CAHI or a specific question concerning a particular home inspection problem. We will have a moderator to keep the meeting moving and also not to dwell on one subject for a long period of time. We ask you all to attend and bring along your questions and concerns so that we can air any grievances or answer questions that you may have had.

I would also like to take this opportunity to apologize to the Liquid Vinyl Siding Company for misuse of their trademark in an article published in the April newsletter. I believed that the name "Liquid Siding" was generic and not a trademark. This name was given to me by the owner of the home that had the problem and we later found out that Liquid Vinyl Siding Company was not the litigant. Again we apologize for the use of a portion of a Trade Marked name.

I hope to see all of you at this month's meeting and don't forget to send in your annual dues if you haven't done so. CAHI provides you all with a great value for your dues dollar.

July Meeting Topic

This month's meeting will be an **Open Forum**

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The Process

If you were to place a pot of water on a flame, water in its liquid form will absorb the heat from the flame. In the process, the water molecules expand. If enough heat is applied, eventually the molecules expand so much that the liquid turns into a vapor. For water, this happens at 212° Fahrenheit. Take that vapor and remove the heat or condense the vapor, the molecules tighten up and go back to a liquid state. The refrigeration or cooling process, as we will call it for the rest of the article, is based on the evaporation and condensation of refrigerants.

Refrigerants are compounds that boil at temperatures must lower than 212° Fahrenheit. R 22, for instance, most commonly used in air conditioning systems for many years, boils off at -41.5°. When released from an upright canister in temperatures above -41.5°, it will boil off immediately and turn into a vapor. When released in temperatures below -41.5° it will be in a liquid form. The compound freezes at - 256°.

The refrigeration/air conditioning system is comprised of components that will help boil and condense refrigerant to remove heat from the air in a conditioned space and release it somewhere else.

Liquid refrigerant is introduced into the cooling coil by a metering device. A capillary tube or thermostatic expansion valve are the most common. The cap tube is a constant meter. The expansion valve is adjustable and is used most with refrigeration. The refrigerant is forced through a small orifice and sprayed into the coil. As the refrigerant enters the coil, it absorbs the heat from the room air being drawn across the coil and boils off. The refrigerant, now a low-pressure gas packed with the heat from the room air, is drawn back to the compressor through the suction line, the larger diameter pipe that runs from inside the home to the outside condensing unit. The compressor is the motor located in the outdoor condensing unit. The compressor uses pistons and valves to raise the low-pressure gas to a high-pressure gas. This high-pressure vapor is pumped through the hot gas line from the compressor to the condensing coil which is part

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of the exterior condensing unit. Here in the condensing coil, the outside air, which is cooler than the high-pressure, high-temperature refrigerant gas, is drawn across the coil by the condenser fan, removing the heat absorbed from the conditioned space, releasing it into the atmosphere and condensing the hot gas to a liquid. Put your hand over the condensing fan when a system is in operation. You should feel warmer air. The liquid refrigerant is now pumped back to the cooling coil to complete the cycle and begin a new one.

What To Look For

When inspecting an air conditioning system, I first do a physical evaluation of the equipment. I check the visible duct work for damage, rust and air leaks. I inspect the plenum on a warm air furnace and the drip pan under an air handler for evidence of leakage or blockage in the condensate lines, among other things. I inspect the condition of the condensing unit, noting units that are out of level, condensing coils that are dirty, suction lines that are missing insulation, open electrical boxes, open or loose wire connections, etc.

A bit trickier is determining how well the system is operating. I first check the temperature drop across the evaporator coil. Ideally, this should be done at the coil itself. However, for our purposes, it can be done by measuring the temperature difference between the room temperature and the air coming out of the supply duct. A temperature difference (TD) of 15 to 20° is desirable. Lower TD's can indicate older, worn compressors, dirty coils, low refrigerant charges among other things. Higher TD's can indicate dirty filters, improper coil size, poor air circulation, etc. Determining the cause of improper temperature differences is best left to an expert.

I also examine the suction line to determine if it is sweating. Condensation should be present and will usually be an indication that the refrigerant charge is full and there is adequate air flow. A frozen line spells trouble. A dry line can again be caused by several conditions. This is always a sign there is a need for a service call.

The sizing of a system is a complicated process and is often miscalculated. It relies heavily upon window area, location of windows, amount of insulation, orientation of the home, overhangs, tree lines, interior heat loads,

etc. Of course, we are not required to determine the capacity of a system or its ability to cool a house efficiently or properly. However, you should keep the following in mind to have a better grasp of the refrigeration process.

We all know that a by product of air conditioning is dehumidification. When a coil or system is undersized, it will remove moisture from the air but will not have the capacity to cool the area. A classic example of this would be a common dehumidifier.

When a coil or system is oversized, it will cool a space quickly, leaving the air humid. This is the theory behind coolers used in flower shops where cooler temperatures and high humidity are needed.

Properly sized and functioning air conditioning systems should cycle on and off. In other words, under conditions that they are designed for, they should reach the set temperature and shut off and restart when the temperature rises, just like heating systems. If you are aware of what is going on around you, you may notice that a unit runs continuously during your inspection even though the space is not exceptionally cool. This could indicate an excessively high heat load, older compressor, dirty coils or low refrigerant. If it's an average summer day and the system is not cycling, it is not functioning properly. Keep in mind that high humidity can cause the system to expend more energy on moisture removal.

I use the above mentioned items to help me determine the operation and condition of a central air conditioning system. They help me determine whether or not the system is in need of service currently.

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REWARD **\$25.00**

GUEST SPEAKER OR NEWSLETTER ARTICLE



CAHI will pay \$25.00 to any member who provides us with a guest speaker for one of our monthly meetings or for any article that is submitted and used in the monthly newsletter.

Your guest speaker's name and contact number should be given to Woody Dawson (203) 272-7400 or Barry Small (860) 655-6383 (barrysmall@yahoo.com).

Articles must be e-mailed to Rich Kobylenski (rkoblenski023@earthlink.net) and should be a PDF or Word document. Articles should pertain to our industry.

We will review articles for content and reserve the right to edit, use and/or refuse them.

Contact Us

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Executive Board

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CT Home Inspection Licensing Board

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The Licensing Board meetings are held at 9:30 am,
Department of Consumer Protection, Room 117, 165
Capitol Avenue, Hartford.

The public is always welcome.

E-mail Bernie Caliendo for the latest meeting schedule at
bsurehomeinspect@juno.com