



A Cracked Heat Exchanger Is Nothing To Ignore

By: Greg R. Wayman, Certified Real Estate Inspector

What is a heat exchanger?

The heat exchanger is the metal wall or tubing that is heated up when the burners are ignited. The inside of the heat exchanger allows the toxic flue gases produced from the burners to exhaust out through the furnace flue. The outside of the heat exchanger is where the cold air passes over, becomes warmed, and is blown throughout the ductwork of the home. The heat exchanger is the only wall separating the toxic flue gases from the supply air. If a crack develops in the heat exchanger, there is a potential for carbon monoxide gas to leak over to the supply side and be blown throughout your rooms. Carbon monoxide gas is odorless. The human senses will not detect its presence. However, there are signs. Light-headedness, nausea, and flue-like symptoms are all signs of CO gas leaking into your home. On an extreme case, if the crack in your furnace is bad enough and the conditions are right, you and your family may enter into a permanent sleep.

Longevity

Gas forced air furnaces last approximately 15 years, some more, some less, depending on how well maintained the unit is. Some conditions that may shorten the life of your furnace are: the evaporator unit of the air conditioner leaking onto the heat exchanger causing it to rust out, dirt/dust building up on the high-limit control switch forcing your furnace to turn on and off more frequently, a dirty filter that drastically reduces air flow which also will force your furnace to kick on and off more, or dirt on the burners producing inefficient flames causing excess soot buildup on the heat exchanger. If a furnace is poorly maintained, it is not uncommon to find a crack in the heat exchanger much sooner than 15 years.

Having your furnace annually serviced is one way to help extend its life. When your furnace reaches 10-12 years, it is strongly recommended that you hire a licensed HVAC (Heating Ventilation-Air Conditioning) company to perform a heat exchanger inspection. This test should be performed annually from this point forward until the furnace is replaced. Why? Just as a piece of metal is bent over and over again eventually fatigues and breaks, a similar force is being exerted on your furnace's heat exchanger. During operation, the thin metal of the heat exchanger is being heated to high temperatures (sometimes over 175 degrees Fahrenheit) and cooled down to room temperature (70 degrees F). Each time, the metal expands as it warms up and contracts as it cools. Eventually, the metal fails and a crack is formed. A crack will always develop in a heat exchanger. How soon depends on the conditions it has been subjected to over its lifetime.

Types of Heat Exchanger Tests

There are three basic types of heat exchangers: clamshell, Serpentine, and tubular. This article is going to focus solely on the clamshell because it is most commonly found on the older models (typically installed before 1990) and is still in use today. The Serpentine & tubular exchangers are common on a portion of the newer furnaces (mid '80's – today) and different tests should be applied to these.

Leak Test:

For the clamshell heat exchanger, the most accurate test is the leak test. This test involves spraying the outside of the heat exchanger with a water-surfactant solution and then looking on the inside to see if it has leaked through. If it has, anyone conducting this test is 100% certain a crack exists. This test will find 95%+ of all cracks in the clamshell heat exchangers.

Visual Inspection:

For a clamshell heat exchanger, a visual only inspection is the most ineffective test. Some companies try to fool you by informing you they use “state-of-the-art” video camera systems to look for cracks. What they are admitting is they do not have proper training to inspect your heat exchanger. Using the expensive camera or mirrors, these companies will only find about 10% of the actual cracks. Why will they fail to find most of the cracks? Most furnaces at this stage of their lives have rust or soot buildup on the inside of the heat exchanger preventing anybody from seeing the cracks. Couple this with the fact that CO gas can seep through cracks not visible by the human eye and you can see their shortcomings.

CO Gas Test:

If conducted alone, the CO gas test is another test where the HVAC company is admitting to you that they do not have proper training to inspect heat exchangers. This test has nothing to do with inspecting the condition of the metal of the heat exchanger. This test consists of boring a small hole above the plenum and inserting a carbon monoxide detector. The only useful information this test tells you is if the furnace is currently blowing carbon monoxide gas throughout the home. If they fail to let the furnace run long enough, the crack may not widen to allow the CO gas to leak out. Also, conditions have to be just right for CO gas to be produced. Unless the flame is burning inefficiently and is finding its way through the crack at that specific time when the test is conducted, their CO detector may never register any levels. If a crack is found using this test, chances are a crack existed in this furnace for almost 2 years! That is a long time to chance the safety of the occupants of the home!!!

Smoke Test:

This test consists of setting smoke canisters inside the heat exchanger and seeing if the smoke leaks to the outside. Most companies that were conducting the smoke test in the past have graduated up to the leak test for the clamshells. The main reasons are the leak test is faster, has a higher probability of finding a crack, and does not set off the smoke detectors. One of the downsides to the smoke test, as with the CO Gas test, is if the heat exchanger is not warmed up enough, the test may not find the crack.

Heat Exchanger Warranties

Typically, the hi-efficiency (90%+) furnaces installed today come with a limited lifetime warranty and the 80% furnaces have a limited 20-year warranty. Warranties vary by manufacturer. A furnace that was installed 15 years ago may not have any warranty remaining, but it is always a good idea to find out if one still exists. Today's warranties are normally transferable from one homeowner to the next if the house is sold. However, a limited lifetime

warranty is usually reduced to a 20-year limited warranty if a house transaction occurs. If the heat exchanger is replaced, the warranty is only good for the time remaining on the original warranty. One important and costly fact to remember is the warranty does not cover the cost of labor to remove the old heat exchanger and install the new. Labor for this repair runs in the ballpark of \$600-\$900! Choosing this route of action is not always the best decision for a homeowner. You end up with a new heat exchanger on a furnace full of old parts that are no longer covered by a warranty. For specific warranty information, please contact your respective HVAC dealer. If you have difficulty locating a dealer for your make of furnace, go to: www.johnmills.net/work/history.html. This website will help you determine who you should try to call.

Greg Wayman is a Board Member of The National Association of Home Inspectors, Inc., NAHI Certified Real Estate Inspector, Heat Exchanger Experts Certified Inspector, Nebraska State Licensed Radon Measurement Specialist, Past President of The Nebraska Chapter of NAHI from '04-'07, Board Liason to NAHI's Marketing/PR Committee and NAHI's Website Committee, and serves on NAHI's Conference Committee. He is also a guest speaker every month at Family Housing Advisory Services Home-Buyer Workshops.



Copyright 2002-2008 F2R, Inc. All rights reserved.
Foundation-2-Rooftop, Inc. Phone: (402) 330-1701 Website: www.F2Rinc.com