

Maximizing Heat Exchanger Life

Heat exchangers are not indestructible. Poor duct design, high or low return air temperatures, high or low temperature rise, furnace short cycling, contaminated combustion air, etc., can and will cause a heat exchanger to fail prematurely.

High/Low Return Air Temp.

Furnace manufacturers publish the minimum and maximum allowable return air temperatures. Failure to follow their instructions will result in shortened heat exchanger life.

Although high return air temperatures are not usually a concern in homes, low temperatures can be a concern. Often your customer will set their thermostat too low which causes the air entering their blower cabinet to be less than the minimum recommendation. “Snow Birds” often set their thermostats to the lowest setting which may be as low as 40 degrees F. This may result in premature heat exchanger failure due to rusting.

Many manufacturers have a minimum return air temperature of 55°F for intermittent operation during short setback periods, or 60°F for continuous operation. Check your manufacturers specs. for your minimums and maximums.

High/Low Temperature Rise

All furnaces list on their nameplate the temperature rise range for a particular model. As an example, a furnace may list **Temperature Rise 45 - 75°F** (also known as *Delta T* or ΔT). This indicates that the air leaving the supply side of the furnace should be no **less than** 45 degrees or **more than** 75 degrees warmer than the return air entering the blower cabinet.

If a furnace is operating outside the temperature rise range specified by the manufacturer, premature heat exchanger failure will result.

High temperature rise is caused by low air flow across the heat exchanger. High ΔT can be corrected by increasing the blower speed to get more air across the heat exchanger.

Low temperature rise is caused by excessive air across the heat exchanger. To correct low ΔT decrease the blower speed.

The foregoing assume you have the correct fuel input and duct work which is sized correctly.

Short Cycling

Over sizing a furnace or setting the heat anticipator incorrectly leads to short cycling. Each time a furnace fires the heat exchanger is cold and below the dew point of the flue gases. The result, condensate depositing on the inside of non-condensing heat exchangers.

This is not a problem if the furnace runs long enough to allow the heat exchanger to heat up and dry this condensate. However, if the furnace is oversized or the heat anticipator is set wrong the burner will short cycle.

Size furnaces to the heat gain of the house using an approved method such as **Manual J** which is published by Air Conditioning Contractors of America (ACCA) www.acca.org.

Contaminated Combustion Air

Combustion air contaminated with such things as detergent, bleach, solvents, refrigerant, dust, salt for water softeners, paint strippers, and so forth may cause heat exchangers to experience extreme corrosion.

Outdoor air is generally less contaminated than indoor air. Unless the furnace is near a possible source of contaminants, such as a dry cleaning shop or a laundrymat, outdoor combustion air is much better for the furnace.

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