777 EDUCATION AND CONSULTING, INC.

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HVAC SOLUTIONS

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TEMPERATURE RISE (ΔT)

The Importance Of Temperature Rise

Temperature rise is the temperature increase measured across the heat exchanger. The difference between return air and supply temperature = **Temperature Rise.**

Each forced air furnace has a recommended temperature rise range published on the rating plate. Temperature rise is often referred to as **ΔT** (delta T) which is read "change in temperature".

This data is shown on a furnace rating plate as a temperature rise range, such as **45-75 degrees F**. This indicates that the manufacturer of that particular furnace model requires no less than a 45^{O}F temperature rise (minimum), and no more than a 75^{O}F temperature rise (maximum) across the heat exchanger.

What can happen if ΔT is less than the minimum? Condensation can occur in places it is not intended resulting in pre-mature rusting of the heat exchanger and/or venting system. **A higher than maximum ΔT** may result in stress cracking of the heat exchanger due to overheating.

Stay within the range specified, for maximum heat exchanger life and longest system life and system efficiency.

Where To Take, And What To Do, About Temperatures

Return air temperature should be taken inside the blower compartment. This will take into account air leakage through a bypass humidifier, outdoor air piped into the return air duct which may be required by your local code, air leakage into the return air duct system, air stratification which may exist in the structure, etc.

Supply air temperature should be taken after the system has run in the heating mode long enough for supply temperature to stabilize. Your supply temperature should be taken 3 feet (1 meter) down stream of the supply plenum in a supply or branch trunk. This will place your temperature probe down stream from the plenum so that your reading will not be influenced by radiant heat energy from the heat exchanger.

How To Correct Problems With ΔT

High temperature rise is usually an indication of low air flow or high input into the furnace. Air flow can be increased by adjusting the furnace fan to a higher RPM if possible. High temp. rise could also be caused by excessive input. This can be corrected by adjusting the manifold pressure

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to manufacturer's specs. and/or changing the main burner orifice/s if they are over- or under-sized to the correct ones specified.

Low temp. rise could be caused from excessive air flow across the heat exchanger or low input due to low gas pressure or excessive air flow.

Min. / Max. Return Air Temperatures

Manufacturers also provide the installer and/or technician with **minimum and maximum return air temperatures**. It is highly possible to have the correct ΔT and still have pre-mature heat exchanger failure due to excessively cold or hot air.

Generic Return Air Information:

Many furnaces set a minimum continuous return air temperature of 60^{O}F. Their intermittent minimum return temperature is 55^{O}F which would become the minimum if using night setback systems. Often the maximum return air temperature is 80^{O}F.

Follow your manufacture's instructions for min. / max. return air requirements for the model you are installing. A customer setting their thermostat too low or too high can have detrimental effects of the life of their equipment. Remember, the **air entering the blower cabinet** is the return air.

Example: 10% of total air is taken from outdoors to meet ventilation requirements for the code, 90% of the air is recirculated. On a 5^{O}F day (outdoor temperature), if the customer is out of town and has their thermostat set at 60^{O}F, using the mixed air formula we can find the air temperature entering the blower compartment: it will be 54.5^{O}F: too cold for continuous operation for most furnaces. This assumes the average return air temperature is 60 degrees, not including outdoor air.

Failure to follow manufacturer's recommendation could affect the life and reliability of the heat exchanger, controls, and motors.

Seminars Coming Soon

High Efficiency Furnace Operation, Maintenance & Service

Fox Valley RSES, Elgin Illinois (near Chicago, O'Hare Airport), Elgin Community College, Saturday, **November 4, 2006,** 8:00 a.m.—4:00 p.m., contact Rich Hoke, at (847) 931-5650, Email: **richhoke@sbcglobal.net**

USING ELECTRIC METERS FOR HVAC

Friday, November 17, 2003, Farmington Hills, Michigan, 1:00—4:00, Afternoon ONLY.

The course will briefly explain the types of meters available. You will also learn how to use a Digital Multi-meter (DMM) and an ammeter safely, when you may need a TRUE RMS meter, how the troubleshooting process works using the correct meter, how to check single and 3-phase motors including compressors, how to read a wiring diagram, why you should never use an ohmmeter on a circuit board with a microprocessor, how to check motor windings on a **GE ECM** variable speed motor, what is "good" voltage and "bad" voltage, how to

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check the electrical integrity of relay and contactor coils, how to multiply current and when it is necessary, how to check thermistors, and how to measure a flame rectified signal (microamperes). Workbook included. Course duration 3 hours. Email **info@777educate.com** for more information.

HOT WATER BOILER OPERATION AND TROUBLESHOOTING *

Saturday, November 18, 2006, Farmington Hills, Michigan, 8:30 — 4:00.

Familiarizes the student with various types of residential and light commercial hot water boilers and
basic operating principles. Topics covered will include: air elimination, baseboard radiation, circulator pumps, expansion tanks, low water cutoffs, piping, altitude/pressure gauges, backflow preventers, series loop and mono-flo piping, pressure reducing valves, high and low limit adjustments, zone valves, control systems and wiring, and electrical as well as water side troubleshooting. No previous boiler experience necessary. Full day seminar. NATE recognition for re-certification is pending.
Email **info@777educate.com** for more information.

READING WIRING DIAGRAMS

Saturday, December 2, 2006, Farmington Hills, Michigan, 8:00 — 4:00.

This course will acquaint technicians with basic electrical terms, components, and circuits found in the HVAC industry. Schematic diagrams will be built from scratch. Each student will also learn to read schematic and pictorial diagrams and fully understand how to determine the sequence of operation of HVAC equipment. This course is **NATE - Recognized** for re-certification credit *(HVAC Schematics)*.

No previous experience required for this 7 hour course. Extensive workbook included. Email **info@777educate.com** for more information.

MICHIGAN COMMERCIAL ENERGY CODE — ASHRAE 90.1

8:30—11:30 a.m. Tuesday, December 5, 2006, Grand Rapids, Michigan, or,
8:30—11:30 a.m. Wednesday, December 13, 2006, New Hudson Michigan.

This course is sponsored by **The Behler-Young Company** and will cover the Simplified HVAC and service hot water provisions of this standard. **Many states have adopted ASHRAE 90.1** as their energy "CODE" for buildings except low-rise residential buildings as their energy code. Inspectors are getting training: you should too.

Course duration is 3 hours and includes a booklet for compliance with the standard. The complete standard is not included. For more information visit **www.behler-young.com** and click on "DEALER TRAINING" for a registration form.

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