777 Education and Consulting, Inc. **December 2005 – Newsletter**

Professional HVAC Training **$4.95** *(FREE for training clients)*

Flame Detection

The majority of fossil fuel burning appliances include fuel oil-, natural gas-, and propane-fired units. If not consumed properly these fuels can become very dangerous resulting in fires or explosions with loss of property, health, or life.

In order for these systems to operate safely they must incorporate several safeties. Among the most important devices on a furnace, range, boiler, makeup air unit, etc. is the flame proving safety.

What happens if the pilot goes out on a standing pilot furnace and the thermostat calls for heat? What happens if the ignition transformer on an oil burner fails to light the oil spray? And, what happens if a direct ignition system fails to light the main burners? There must be some sort of safety that will prevent fuel from pouring unchecked into the combustion chamber without an adequate source of ignition.

Thermal Detection

For years the heating industry utilized thermal detection systems to prove or disprove the presence or absence of flame and shut down the system if flame was not detected in a predetermined time. They rely on heat from a direct flame or flue gasses, hitting a detector. The first systems utilized a bi-metalic element which caused contacts to open and/or close at the right time. These systems are slow responding due to heat being the driving force. In addition to bi-metal sensors, thermocouples and liquid filled sensors are also thermal detectors. Some of them may take up to 180 seconds to react to no flame.

Visual Detection

Visual detection systems are the current standard for most oil burners and many commercial or industrial gas and oil burners. Modern oil burners utilize a cadmium sulfide cell (cadcell) which actually responds to the light intensity of the flame. Cadcells are much faster to react to flame or no flame than their older thermal detection counterparts known as “Stack Controls”.

Electronic Detection

The fastest detection system is electronic flame detection. Sensing speed and reliability are this system’s greatest assets. Reacting to flame in less than 1 second, these systems dominate the sensing method preferred by modern gas-fired furnace and boiler manufacturers. They can be found on units employing intermittent pilot, direct spark, and hot surface ignition.

A flame sensor is used to conduct electricity through a flame. If the flame sensor and ground area are designed correctly, the flame has the ability to change the current flow from alternating current (AC) to direct current (DC). Although the current flow is extremely small, normally less than 10 microamperes (μA), it can be measured with a microammeter where 1 microampere = 1 millionth of an ampere (.000001 A).

Coming

The January 2006 newsletter will explain the cadcell visual detection system used on modern oil burners.

For February 2006 we will discuss the concept of flame rectification and how to test for correct μA.

Contact Information:

Marcus Metoyer, Jr., CM info@777educate.com.
Our website address is: www.777educate.com
for training information and
a complete list of courses..

For the current and Jan. - Jun. 2006
training schedule in Michigan:
www.behler-young.com/dealertraining.htm

777 Education and Consulting, Inc.
HVAC/R Training Specialists
3131 Brisbane Dr.
Lansing MI 48911
Phone (517)371-4101 FAX (517)371-4105

NEW Classes To Be Offered By 777 Education and Consulting, Inc. In 2006

- ✓ **13 SEER Sales & Installation Standards**
- ✓ **ASHRAE 90.1**
- ✓ **Heat Pump**
- ✓ **Psychrometrics**
- ✓ **Refrigeration Pipe Sizing/Design**
- ✓ **R-410a Training / Certification**
- ✓ **Residential Duct Sizing**
- ✓ **TXV Operation and Troubleshooting**

For the Behler-Young training schedule in Michigan:
www.behler-young.com/dealertraining.htm

The 2006 Behler-Young training schedule will be published to their website and 777 Education's in mid-December 2005.