Venting of Combustion Equipment

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One of the hazards associated with the operation of combustion equipment (such as boilers, water heaters, furnaces, etc.) inside buildings is the operation of burners with insufficient air to completely burn all fuel, which in turn produces soot and carbon monoxide – two kinds of unburned fuel. In fact, carbon monoxide is a normal product of combustion that can be produced by any fuel-burning device.

Carbon monoxide is often called a "silent killer." It is an invisible gas without any taste or smell, and it does not cause any unusual feeling in the nose, mouth or throat as it is breathed in.

The most common symptoms of carbon monoxide poisoning are headache, dizziness, weakness, nausea, vomiting, chest pain and confusion. High levels of carbon monoxide can cause loss of consciousness and death. Unless suspected, carbon monoxide poisoning can be difficult to diagnose because the symptoms mimic other illnesses. Moreover, carbon monoxide exposure can result in long-term psychiatric problems (more likely to occur in older individuals), such as personality changes, dementia and psychosis.

According to the *Journal of American Medicine*, exposure to carbon monoxide is the leading cause of accidental poisoning deaths in the United States. Fifteen hundred people die annually from carbon monoxide poisoning, while another 10,000 seek medical treatment. It is believed that many more are misdiagnosed or never seek medical care.

Though carbon monoxide poisoning is a serious and increasingly common occurrence, it is also preventable, provided maintenance technicians take extra care when operating combustion equipment. There may be many reasons why a burner does not receive sufficient air to combust all fuel, such as improper burner adjustment, blocked combustion air openings, or cluttered boiler rooms. However, the real danger occurs when combustion gases escape into a building.

One of the ways combustion gas escapes into buildings is when different types of draft systems are connected, in essence connecting a natural draft system with a mechanical draft system. A natural draft system uses the heat of combustion to vent the combustion gases (heat rises). A mechanical draft system uses the mechanical

Carbon Monoxide (CO) Poisoning

Carbon monoxide is often referred to as CO, which is its chemical symbol. Red blood cells absorb CO over 200 times more readily than oxygen. As levels of CO in the air rise, this gas replaces oxygen in the bloodstream. As a result, body tissues are damaged and may die due to a lack of oxygen.

Employers and workers should be aware of the danger of carbon monoxide poisoning from fuel-burning equipment. They should know the warning signs of carbon monoxide exposure—headache, dizziness, confusion, nausea and irregular heartbeat—and should NEVER ignore them when working where fuel-burning equipment is being used.

Centers for Disease Control and Prevention, U.S. Department of Health and Human Safety

force of a blower to vent the products of combustion. Mechanical draft systems are usually described as being:

Forced draft –in which the blower is located at the inlet of the venting system, or

Induced draft – in which the blower is located near the outlet of the venting system (usually at the rear of the fuel-burning equipment.

A national standard related to mechanical draft systems is found in the *National Fuel Gas Code*, 1999 edition (NFPA-54). This standard provides the following:

Mechanical Draft Systems

a. Gas utilization equipment requiring venting shall be permitted to be vented by means of mechanical draft systems of either forced or induced draft design.

b. Forced draft systems and all portions of induced draft systems under positive pressure during operation shall be designed and installed so as to prevent leakage of flue or vent gases into a building.

c. Vent connectors serving equipment vented by natural draft shall not be connected into any part of mechanical draft systems operating under positive pressure.

Subparagraph (b) above essentially requires that the venting system under positive pressure (mechanical draft) must be gas-tight to prevent leakage of the combustion gases into the building. A connection into a positive pressure system from a natural draft system breaks the gas-tight envelope by providing a place for the combustion gases from a mechanical draft system to escape into the building through the open natural (atmospheric) burner. Subparagraph (c) prohibits connecting an atmospheric system into a mechanical draft system for the reasons stated above.

This type of improper installation is not uncommon. Systems must be checked to ensure that mechanical draft and natural draft systems are not cross-connected.

IMPORTANT NOTICE TO MANUFACTURERS AND AUTHORIZED INSPECTORS

Effective immediately, manufacturers submitting data reports to complete registration need send only the original data report.

Since its inception in 1921, the National Board's registration process has required the manufacturer to submit an original plus one legible copy of each data report. The original was used for permanent storage and the copy was used for adminstrative processing. After processing, the copy was senton to the National Board member in whose jurisdiction the boiler or pressure vessel was to be installed.

Recently, the National Board completed testing and implementing a new scanning and digital storage process for data reports. With this new process, the original data is scanned and then sent to the appropriate National Board member.

Additional copies of the data report are no longer required. Please note that this change must also be reflected in the manufacturer's written quality system.