Hazardous Areas

A question frequently asked is whether a direct gas-fired heater can be utilized to provide tempered make-up air and space heating for hazardous areas. These areas may include the handling, processing or storage of combustible or explosive materials.

There are no ANSI standards or national building codes that specifically address the application of direct gas-fired heaters for these installations. NFPA 54/ANSI Z223.1, the National Fuel Gas Code and ANSI Standard Z83.4 for Non-Recirculating Direct Gas-Fired Industrial Air Heaters describe prohibited installations: "Direct gas-fired industrial air heaters shall not use recirculation room air in buildings that contain flammable solids, liquids, or gases, explosive materials, or substances that may become toxic when exposed to flame."

The International Mechanical Code states "Direct-fired heaters shall not recirculate room air across the burner in hazardous locations or where exposed to substances that are made toxic by exposure to flames."

When considering the advisability of these applications, it is important to remember that direct gas-fired heaters are designed to burn either natural or LP gas, which are combustible gases. These heaters have built-in safeguards which include the provision that the blower must turn on and air flow must be proven before the gas valve opens. This air movement purges the heater cabinet with at least four air changes to expel gases that may be in the heater cabinet due either to a leak in the gas train or from the distribution duct work. A two position motorized discharge damper should close to prevent migration of contaminated room air into the heater when the blower is not operating. The damper motor should not be located in the hazardous space.

The open flame in the heater should not be a concern. For a flammable material to encounter the flame, it would have to enter the heater either through the heater's inlet or cabinet, or to migrate upstream against the discharge airstream. The velocity of the airstream in the vicinity of the burner will typically exceed 3,000 FPM (34 mph). Obviously, it is highly improbable for this upstream migration to occur.

To avoid the ingestion of these materials through the cabinet, the heater should not be located in the hazardous area and should always be equipped with filters. The heater can be installed on the roof, mounted on a pad outside or located in an adjacent interior space and then ducted to the hazardous area. The inlet to the heater should be isolated from any plant exhaust.

The remote control station for the heater should also be located outside of the hazardous area. Intrinsically safe devices should be used for the sensing of the space temperature. The thermistor for a Cambridge electronic thermostat and the Maxitrol ES225A space temperature sensor are considered intrinsically safe.

The wiring between the temperature sensor and the remote control station should be installed in accordance with the National Electrical Code for the level of protection required for the environment in which the devices are mounted.

To ventilate a hazardous space properly, the make-up air unit will typically be electrically interlocked with an exhaust fan, with the fan and heater running continuously. An entering air thermostat acts as an economizer, shutting the burner off when the outside air temperature approaches the desired space temperature. The heater should discharge a pattern that will sweep the entire room, ventilating it completely. Where fumes and vapors are heavier than air, the inlet to the exhaust should be taken from a point within 12 inches above the floor.

Direct gas-fired heaters have been installed in numerous hazardous area applications. Applying these guidelines will help insure safe and successful installations in the future.