STERLING HVAC PRODUCTS

Picking the Right Unit Heater for Your Building

Gas Unit Heater Selection

By Eric Irmscher

Most unit heater manufacturers have a variety of unit types, features and options to choose from. Picking the wrong options can result in a higher install cost, occupancy comfort issues or even premature unit failure. Knowing which options to pick can extended the life of the unit while ensuring the performance and comfort you require. This paper will help determine which options are right for your building.

The first choice to determine is if your space requires standard or separated combustion venting. Standard combustion venting takes air from the space to use for combustion. However, separated combustion takes outside air for combustion through a combustion air inlet pipe. Only a few manufacturers make units that can be field converted to separated combustion so it is important to select the correct type before the equipment is purchased. Most residential applications will be standard combustion. Commercial spaces will vary based on building type. Separated combustion should be used if the building meets one or more of the criteria below:

- If there are chemicals or debris in the air that are not good for combustion: Some examples would be wood or textile dust, chemical cleaners, car or welder exhaust, or paint fumes. These contaminants may cause the unit to produce excessive amounts of CO or CO_2. In addition to a possible safety hazard, the soot may build up inside the unit reducing the unit's efficiency. This could lead to occupancy comfort issues.
- A high humidity or corrosive environment: The increased water vapor in the air will prevent the unit from getting complete combustion. This will lower the BTU output and may increase the CO or CO_2 produced. In addition to reducing the unit efficiency, these environments will corrode the burner, heat exchanger and other components within the unit. Separated combustion will take in outside air and extend the life of the unit while improving performance.
- In applications where the space is under a slight negative pressure: Unit heaters rely on an internal power venter to push the flue gas through the flue pipe to the outside. If the space is under a negative pressure and combustion air inlet is open to the space, the power venter might not have enough power to push the flue gas through the flue pipe. This could result in the flue gas getting pulled through the unit into the space. This will cause CO and CO_2 levels in the space to rise, which may pose a serious safety hazard.

Next, determine if your space requires a propeller fan or blower. Propeller fans are designed for units hung in the space without any additional external static pressure (Note: The manufacturer's accessories, such as louvers and directional nozzles should not be counted as external static pressure and can be used with propeller style units). However, if ductwork is going to be connected to the unit, a blower will be required to overcome the additional static pressure drop of the ductwork.

While there are a variety of manufacturers for unit heaters, most use either a clamshell or tubular style heat exchanger. Clamshell is a very old design with each cell made from two stamped halves welded together. When the two clamshell halves are heated they should expand evenly. However, in some cases, one side may expand quicker than the other placing stress on the weld. Over time this may cause the weld or heat exchanger to crack. For tubular units, each "cell" is made from a single tube so it will always expanded evenly. In most cases, the tubular design is also more efficient, has a longer life expectancy and corresponding warranty. However, it should be noted that tubular unit heaters typically have a different dimension than the clamshell design. While the tubular design is usually preferred, for replacement applications, the clamshell design may be a better fit due to unit dimensions and limitations within the space for clearance requirements. When replacing a unit, different manufacturers or types may have different venting requirements that require the venting be modified or replaced. Check the installation manual of the new unit for exact venting requirements and dimensions.

With the venting method, fan and heat exchanger type selected, you have identified the best model for the application but there are still additional optional accessories you may want to select. The following is a list of optional features and accessories to help extended the life of the unit and possibly reduce the operating cost.

The heat exchanger, flue collector and burner material is one of the most important options to extend the life of the unit. Aluminized steel is standard for most manufacturers on non-condensing unit heaters since it has the lowest first cost. However, stainless steel is recommended for the following environments:

- High humidity environments – over time the excess moisture will corrode the aluminized steel causing it to fail prematurely.
- Corrosive environments or coastal environments – Stainless steel will offer an additional level of corrosion protection from salt and other chemicals in the air.
- Areas where ambient temperature is below 40°F – Condensate can form on the heat exchanger when the ambient temperature is below 40°F. This can cause corrosion similar to high humidity environments. Note, most manufacturers do not recommended installing the units in spaces below 50°F. Below this temperature, the flue gas may condense into a corrosive liquid, damaging the flue pipe, unit and other materials/components.

If the heat exchanger is stainless, it is also recommended that the burner and flue collector be stainless since they will be exposed to the same conditions.

While the gas control selection will not affect the life expectancy of the unit, it can affect initial cost, operating cost and occupancy comfort. Single stage will have the lowest first cost but will not be able to maintain a precise space temperature. If it is a warehouse or other application where the main concern is just keeping pipes or other equipment above a certain temperature, this may be the most cost effective option. However, if the space is occupied, this could lead to occupancy comfort issues as it will have difficulty maintaining an exact temperature. Two stage or modulating gas control has a higher initial cost but is better able to adjust the discharge air temperature to meet the space needs. In addition to increased occupancy comfort, modulating gas control allows the unit to run at part load which improves the unit efficiency and reduces cycling. This can lead to a lower fuel bill and operating cost.

The final section is motor type. Open Drip Proof (ODP) motors have openings in the back of the motor to help dissipate heat and cool the motor. Totally Enclosed (TE) motors are sealed on the back of the motor and use a heat sink to help dissipate the heat. ODP motors have a lower initial cost but should not be used in an environment where debris may clog the vent openings. This will cause the motor to overheat and fail prematurely. In these environments, a Totally Enclosed (TE) motor is recommended.

With the above considerations, you can expect a long life from your unit heater without compromising occupancy comfort. However, if still unsure which is the right unit for your application, many manufacturers have additional resources to assist with unit selection. Consult your local distributor for additional information.