Finding the Right Spot with Unit Heaters

By Jamie Tuinstra

Unit heaters are ideal for garage and warehouse warming, as well as storage areas, greenhouses and other large, enclosed spaces, but there's an art to their placement. Where to hang them and where not to, how best to apply the heat they provide, and how to size them for the task. Some applications are ideal for condensing systems while others aren't.

When selecting unit heaters, consider the following:

1. Type of heating medium available: gas, electricity, fuel oil, steam or hot water
2. Type of unit (vertical, horizontal or power-throw)
3. Mounting height
4. Sound level
5. Size

Quality heating must be properly piped, wired, suspended and vented. If any one of these areas is ignored, trouble will follow.

Sizing it right

When deciding on a unit heater, you must know how much heat is needed. Information about sizing a heater and estimating monthly energy costs can be found on manufacturer websites, or by consulting with a manufacturer's rep.

A heater's size must be chosen to offset the heat loss of the space, taking into account heat-throw or spread and piping arrangement.

To select size:

A. Determine inside temperature to be maintained and the design temperature for the location. The difference between these two figures is the design temperature difference.

B. Calculate net areas in square feet of glass, wall, floor and roof exposed to outside temperature or to unheated spaces. Calculate doors as all glass.

C. Choose heat transfer coefficients and compute heat transmission loss for each type of area in BTUH by multiplying each area by its coefficient times the temperature difference. The overall coefficient of heat transfer is the U-factor. The steady state thermal resistance of something is known as its R-Value. Heat loss calculations use the U-factor; however, the U-factor can be calculated if the R-value is known.

D. Calculate room volume in cubic feet and multiply by the estimated number of air changes per hour due to infiltration (usually by one or two). Determine cubic feet per hour of air exhausted by ventilating fans or industrial processes. Substitute the larger or these two figures in the formula to determine the heat required to raise the air from outside to room temperature.

$$\text{BTUH} = \frac{(\text{cu.ft. per hr.})\ (\text{temp. difference})}{55}$$

E. Totals of BTU losses from C and D will give total heat to be supplied by unit heaters. Note – if processes performed in the room give off considerable heat, this may be determined as accurately as possible as heat gain and subtracted from the total.

F. Add 10% to heat loss figures for areas exposed to prevailing winds.

G. Match total BTUH heat loss to output of catalogue model number(s) of unit type(s).

Don't take the ol' guesswork shortcut. Oversized unit heaters cycle too frequently and waste energy. Undersized units add other sources of unhappiness into the mix.

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Condensing vs. non-condensing

An important consideration is whether or not to use condensing systems. While they offer greater efficiency, they're not always the perfect fit for every situation.

Condensing systems extract BTUs through the moisture that collects on stainless steel heat exchangers inside. But you must consider how to properly get rid of the (slightly acidic) condensate.

Condensate lines must be channeled into drain lines inside the building, or outside. And of course, unprotected lines outside won't do well in midwinter temperatures. Also consider the use of condensation filtration or a "polishing" system to neutralize the moisture before it's dumped.

If condensate isn't properly taken care of, it can greatly affect the space that the unit heaters are in. Wood floors warp, puddles can be hazardous for people working in the area, anything electronic can be destroyed – and cause a potential danger, like shortages. And water can also damage anything that's being stored.

Make sure condensate lines are clear of obstruction and flowing freely on a regular basis, and that the "P" trap has been primed and filled with water and condensate overflow switches are working properly. Some installers will even install a spare condensate line next to the old one. Plug the ends. Now there's a quick answer to a "clogged line" call.

Yoga? Maybe not

Temperature and humidity are important. Recently, a few yoga studio owners and their mechanical contractors learned that a gas-fired unit heater was not right for their needs. Bikram, or "hot yoga," is a 90-minute yoga class in a studio that's cranked to 104°F with a humidity of 50%. The unit heaters weren't designed for a location with that degree of heat and humidity and, well, they stopped working.

Location, Location, Location

Improper mounting height is responsible for most heater installation problems. When unit heaters are installed at heights greater than recommended, improper heat distribution is the result. It's just the opposite when unit heaters are installed too low. Excessive air movement is sure to cause discomfort.

Typically, to get the best heat circulation and distribution, unit heaters should be mounted on exterior walls, especially when the space calls for more than one unit. This creates a whirlpool effect as each unit throws heat down a different wall. That natural movement and cascading of warmed air can be predicted to the benefit of those working in the space.

Use as few unit heaters as possible to give proper heat coverage to the area to be heated. The number of units selected will depend on the heat throw or spread of the individual heaters.

If the space doesn't have a need for more than one heater, mount the heater in a corner of two exterior walls and aim it at a 45° angle, pointing the louvers down. It will bounce the air in a circle around the room. Locating the thermostat away from the airflow is also critical to ensuring comfort throughout the space.

If more than one heater is called for, space them so that each supports the air stream from another heater. This sets up circulatory air movement to produce a blanket of warm air along the walls.

Another location factor to keep in mind: what's going to be in the space that's getting heated? Are there woodworking projects or spray finishes? Spaces that could have a potential fire danger should have a heater with a separate combustion chamber, burning fresh outside air instead of the dust- or paint-laden air inside a garage or workshop. Not only are there fire hazards, but the dust and paint particles will likely cause burner problems and unhappy customers.

The best option for spaces such as these is a blower type heater in a separate room with ducting to the dust-laden or potentially flammable space. On that note, don't install atmospheric gas- or oil-fired units in areas where chlorinated, halogenated or acid vapours are present in the atmosphere.

Vent it right

A heating system is only as good as the venting system it's connected to. A poor vent system will not only cause problems with proper combustion of the fuel being burned, but it can also lead to spillage or leakage of the products of combustion into the heated space.

Here are three rules to follow to assure proper venting:

- Keep vent runs as straight as possible
- Be sure that all vents terminate with proper vent caps
- Making sure vent size is appropriate for the appliance

These apply to vertical and horizontal applications. Vertical vent systems must terminate vertically, and at a reasonable distance above the roof to prevent snow buildup from blocking the vent terminal. Horizontal vent systems must terminate horizontally – and not near air inlet openings to the structure, high enough or guarded to prevent accidental contact by people or equipment.

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