

# TECH TIPS

## Changes in Product Selections to Meet ASHRAE 90.1 Standards

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ASHRAE Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings, is a document that is in a state of continuous maintenance. That means changes to the standard are ongoing, and addendum are submitted for public review and approval on a frequent basis. Since the 2004 version, there have been three additional printed/complete versions (2007, 2010, and 2013) where all the addendum that have gone through the public review process and have been approved are added to the prior release.

For example, between the 2007 version and the 2010 version there were over 100 approved addenda, 52 of which affect mechanical systems. A previous Price Tech Tip discussed the individual state implementation of the various versions of ASHRAE 90.1. This article will provide some guidance as to changes in selection of Price products to meet the requirements of ASHRAE 90.1-2010. A separate white paper detailing all the addendum/changes, ASHRAE 90.1 Changing from 2007 Version to 2010 Version, is available on the Price website.

### CHANGES IN EQUIPMENT EFFICIENCY REQUIREMENTS

#### Air Volume Regulation

There is a requirement for all fan coil and air handling equipment with motors  $\geq 5$  HP to have either two-speed motors or variable-speed drives. At cooling demands of 50% or less than design, the air volume will be reduced to either half of the full fan speed or the air volume that will meet the ventilation requirements of ASHRAE 62.1. This primarily impacts our blower coils due to the motor size, however, the ability to vary the fan air volume is available on all of our fan products

that use the electrically commutated motor (ECM) technology.

Discharge air temperature sensors may be required. This is due to the potential for high discharge air temperatures when providing reheat, as the air volume has been reduced. When electric reheat is selected, the first stage of heat should be sized by:

$$\text{kW} = (\text{minimum air flow volume}) / 70$$

Sizing electric reheat using the above formula will prevent hot spots from forming which can then cause the thermal limits to trip.

A common mistake made by new design engineers when selecting a two-stage electric heater is to divide the total kW by two. Since the reheat should start when the air volume is at the minimum cooling airflow, airflow volume should be divided by 70 to select the first stage of electric reheat. If more than two stages of reheat are used, then the other stages should be selected based on the volume of supply air at the point of engaging the heater stage contactor. It may be that a simple analysis will show that our solid state electric heater control with discharge air temperature is a more economical selection and is very specifiable.

#### Motors and Transformers

Our motors and transformers meet the federal requirements outlined in the 2010 and 2013 versions of ASHRAE 90.1.

### CHANGES IN SYSTEM CONTROL AND DESIGN REQUIREMENTS

#### Outside Air

##### Demand Control Ventilation

The 2010 version of ASHRAE 90.1 calls for zones

with more than 40 occupants per 1,000 square feet to design using demand control ventilation. Our terminal controls have CO<sub>2</sub> sensors as an option, which would allow the local zone level sensing for demand control ventilation. One consideration is the minimum airflow when the zone is unoccupied but still requiring the base ventilation of outside air per square foot. The minimum volume of air may be lower than some terminal flow sensors can resolve. Our Price Intelligent Controller has a low-flow option that works very well for this scenario.

#### Airside

##### Overhead Heating with Supply Air

Where reheating is permitted by 90.1, zones that have both the supply and return air openings greater than six feet above the floor shall not supply heating air more than 20°F above the space temperature set point. Price terminals with reheat can use our discharge air temperature control technology to meet this requirement.

##### Dual Maximum Control on VAV Boxes

Addendum H was geared towards zones using direct digital controls. It is intended to take advantage of the energy-saving potential that direct digital controls offer when controlling the air volume and reheat. It establishes the heating maximum airflow volume to no more than 50% of the cooling airflow volume when it is modulated from the 20% minimum. See **Figure 1**.

This addendum allows the reheat airflow to increase from 20% to 50% when the reheat starts at the low end of the thermostat dead band. Most designers have been using a turndown of 30% before reheat would be started. This is somewhat concerning due to the potential

for electric reheat to trip on the thermals or to provide air temperatures in excess of 20°F above the space temperature set point. The discharge air temperature control on our terminals with electric heat avoid this issue as the discharge air temperature is regulated to be no more than a specified amount.

#### VAV Control on Lab Exhaust

Hospitals and laboratories are now no longer exempt from the VAV requirement for spaces that don't require pressure control. Price has many different terminal and controls solutions that meet these needs. In particular, the Price Venturi Valves with Price Critical Controls should be considered.

#### Duct Leakage

For ductwork, the duct leakage is now required to be seal class A.

**Seal Class A:** A ductwork sealing category that requires sealing all transverse joints, longitudinal seams, and duct wall penetrations. Duct wall penetrations are openings made by pipes, holes, conduit, tie rods, or wires. Longitudinal seams are joints oriented in the direction of airflow. Transverse joints are connections of two duct sections oriented perpendicular to airflow.

- Openings for rotating shafts shall be sealed with bushings or other devices that seal off air leakage (standard on our terminal units).
- Pressure sensitive tape shall not be used as the primary sealant unless it is certified to comply with UL-181A or UL-181B and the tape is used in accordance with that certification (we comply as we don't use pressure sensitive tape).
- All connections shall be sealed. When terminals are ordered with the LLC option, we provide low-leakage construction and seal all appropriate leakage sites. For more information on this option, please see our leakage terminal options on page F-58 of the Price Catalog version 7.

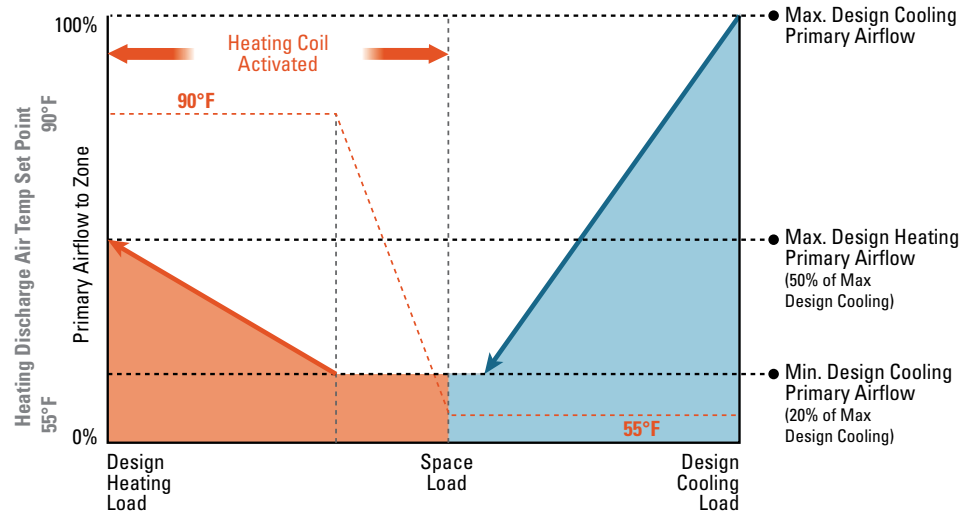


Figure 1: Dual maximum control for zone

#### Waterside

##### Radiant Panels

Radiant panels transfer heat (cooling or heating) via radiation from the room-side face of the panel. The back side of the panel may be exposed to spaces that may be unconditioned. A study showed that increasing the insulation thickness beyond the R-3.5 (from 1 in. to 4 in. thickness) had a minimal impact on the life-cycle cost of the application. As a result, radiant panels now require the non-occupied room side of the panel to be insulated with a minimum of R-3.5. This is a standard option of the Price radiant panels.

For more information on the changes between the 2007 and 2010 versions of ASHRAE 90.1, see the standards page on [www.ashrae.org](http://www.ashrae.org). For assistance in selecting Price products, please contact our application engineering group.