INTERPRETATION IC 90.1-2016-6 OF
ANSI/ASHRAE/IES STANDARD 90.1-2016
Energy Standard for Buildings Except Low-Rise Residential Buildings

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Reference: This request for interpretation refers to the requirements presented in ANSI/ASHRAE/IES Standard 90.1-2016, Section 6.5.2.6, regarding ventilation air heating control.

Background: Section 6.5.2.6 describes "units" commonly known as DOAS. The section limits warming supply air above 60ºF or "neutral". DOAS systems have often been applied with "neutral air" providing the advantage of decoupling the ventilation system from the temperature control system. The disadvantage is neutral air from the DOAS which could contribute to cooling loads, does not provide cooling. In humid climates where outside air temperature has little to do with total building loads, humidity control is more valued than small reductions in energy consumption. Section 6.5.2.3 regarding dehumidification includes an exception to utilize recovered energy for reheat. Section 6.4.3.6 governs use of humidity controls.

Interpretation: Section 6.5.2.3 exception 5 allows "units" (DOAS) to operate at above 60ºF allowing "neutral air" operation if any zone indicates a call for dehumidification regardless of the percentage of zones in cooling or the outside air temperature.

Question: Is this interpretation correct?

Answer: No.

Comments: While Section 6.5.2.3 does allow reheating of air cooled for dehumidification, it does not preclude Section 6.5.2.6 from limiting that heating to what is efficient related to overall building thermal control. A review of direct expansion DOAS units available with condenser reheat capability found that typically, there was also an outdoor coil that could be used for heat rejection and that controls were available to modulate the reheat applied to the ventilation airstream so that the DOAS supply air temperature could be either reset or limited to 60ºF. Dehumidification is achieved by reducing the humidity ratio of the supply air, not by reheating it to a high temperature to achieve a low relative humidity. Since dehumidification is accomplished with the cooling coil, reheat should only be applied to temper comfort impacts, and the committee felt allowing 60ºF supply air would accomplish this.

When the supply temperature is at or below 60ºF, any zones requiring additional heating resulting may use the zonal heating system to provide heating. This heats the ventilation air only in the zones where needed while allowing cooling with the 60ºF or lower supply air for zones that require cooling. If DOAS ventilation air were heated to neutral (say 72ºF), then any benefit of cooling spaces with the dehumidified air that was previously cooled would be lost. From a temperature control standpoint, delivering DOAS at or below 60ºF still retains control of the zone temperature by the zone heating and cooling systems.

The intention of this section is to specifically disallow use of a "neutral" or higher temperature ventilation air control strategy in a DOAS when the zones served are mostly in cooling. The requirement does allow a higher temperature when a majority of zones do not require cooling. This can be determined by a polling of zone conditions or based on an outside air temperature representing the cooling balance point. However, when the majority of zones are in cooling, or expected to be in cooling based on outside

temperature, the supply air temperature setpoint of the DOAS is limited to 60ºF, even if recovered heat is used for reheat.

Relevant sections for committee review:

6.5.2.6 Ventilation Air Heating Control
Units that provide *ventilation* air to multiple zones and operate in conjunction with zone heating and cooling *systems* shall not use heating or heat recovery to warm supply air above 60°F when representative *building* loads or *outdoor air* temperature indicate that the majority of zones require cooling.

6.5.2.3 Dehumidification
Where humidity *controls* are provided, such *controls* shall prevent *reheating*, mixing of hot and cold airstreams, or other means of simultaneous heating and cooling of the same airstream.

Exceptions to 6.5.2.3

1. The *system* is capable of and configured to reduce supply air volume to 50% or less of the design airflow rate or the minimum *outdoor air ventilation* rate specified in ASHRAE Standard 62.1 or other applicable federal, state, or local code or recognized standard, whichever is larger, before simultaneous heating and cooling takes place.
2. The individual fan cooling unit has a design cooling capacity of 65,000 Btu/h or less and is capable of and configured to unload to 50% capacity before simultaneous heating and cooling takes place.
3. The individual *mechanical cooling* unit has a design cooling capacity of 40,000 Btu/h or less. An individual *mechanical cooling* unit is a single *system* comprising a fan or fans and a cooling coil capable of providing *mechanical cooling*.
4. *Systems* serving *spaces* where specific humidity levels are required to satisfy process needs, such as vivariums; museums; surgical suites; pharmacies; and *buildings* with refrigerating *systems*, such as supermarkets, refrigerated warehouses, and ice arenas, and where the *building* includes *site-recovered energy* or *site-solar energy* that provide *energy* equal to at least 75% of the annual *energy* for *reheating* or for providing warm air in mixing *systems*. This exception does not apply to *computer rooms*.
5. At least 90% of the annual *energy* for *reheating* or for providing warm air in mixing *systems* is provided from *site-recovered energy* (including condenser heat) or *site-solar energy*.
6. *Systems* where the heat added to the airstream is the result of the use of a desiccant *system*, and 75% of the heat added by the desiccant *system* is removed by a heat exchanger, either before or after the desiccant *system*, with *energy* recovery.