INTERPRETATION IC 90.1-2016-2 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 6.5.4.4, regarding chilled and hot water temperature reset controls.

Background: Section 6.5.4.4 Exception 2 states "Where a specific temperature is required for a process." The term "process" is vague and is not defined in the standard. Typically when people think of "processes" they think of heating or cooling for a specific process such as cooling for a manufacturing process or for a data center but generally not comfort cooling.

In the 2013 version of the standard, there was an exception 1) that stated "Where the supply temperature reset controls cannot be implemented without causing improper operation of heating, cooling, humidifying, or dehumidifying systems".

In the 2013 version it was clear that if the temperature reset controls were implemented and resulted in a negative impact, such as unacceptable increase in space relative humidity above current recommended levels, then one was exempt from the standard within those limitations. By deleting that exception and adding the undefined term process, it appears there could be a limitation to the exception, and it's requiring temperature reset controls for 'non-process' applications that require a specific temperature.

Depending on how one defines "process" this could have unintended implications. What about comfort cooling applications that require upper limit humidity control which requires water to be cold enough to control humidity? Is that a process?

Interpretation: If humidity control and specific system temperatures are required for comfort cooling, regardless of the application, then the design would meet exception 2 and be exempt from Section 6.5.4.4 for the duration that the temperature or relative humidity limits could not be maintained if reset as noted in the standard.

Question: Is this interpretation correct?

Answer: No

Comment: Exception 2 applies to a "process" which refers to processes using *process energy*, which is defined as:

> *process energy*: energy consumed in support of a manufacturing, industrial, or commercial process other than conditioning spaces and maintaining comfort and amenities for the occupants of a building.

So this exception was not intended to apply to normal comfort cooling and dehumidification.

The reason why the prior exception for humidity control was eliminated was because it was often abused and is not actually necessary: humidity control can be effectively maintained even with chilled water supply temperature (CHWST) reset. Contrary to conventional wisdom, the impact of CHWST reset on the dehumidification capability of a cooling coil is quite small as long as the coil is able to maintain the supply air temperature at setpoint. Space humidity is a function of the supply air humidity ratio which in turn is a function of the coil leaving dry-bulb temperature setpoint. Regardless of CHWST, the air leaving a wet cooling coil is nearly saturated; lowering CHWST only slightly reduces supply air humidity ratio. So as long as the supply air temperature can be maintained at the desired setpoint, resetting CHWST will not significantly impact space humidity. Proper CHWST reset is accomplished as follows:

- For systems with direct digital controls (DDC), which is the most common control system type for chiller plants and required for most chiller applications by Section 6.4.3.10.1, CHWST reset must be based on cooling coil valve position feedback. Using valve position for reset inherently cannot cause coils to be starved – if the valve is fully open and supply air temperature setpoint cannot be maintained, the reset logic will cause the CHWST to be reset downward until the supply air temperature falls to setpoint. Thus reset from valve position inherently cannot cause high space humidity problems.
- For the few chilled water systems without DDC, reset must be by "representative building loads (including return water temperature) or by outdoor air temperature". Unlike valve position reset, these indirect reset strategies <u>can</u> result in starved coils and loss of humidity control if the reset is too aggressive. But the Standard does not limit how much the CHWST must be reset. So, for example, in a humid climate with outdoor air temperature reset, the setpoint could be reset from the design CHWST, say 42°F (5.5°C), when the outdoor air temperature is above 59°F (15°C) proportionally up to 52°F (11°C) as outdoor air temperature falls to 50°F (10°C). These setpoints could be even more conservative at the discretion of the designer or operator. The important issue is that the control system has the capability to provide some level of CHWST reset, however conservative.