

**DOCKETED**

<b>Docket Number:</b>	22-BSTD-01
<b>Project Title:</b>	2025 Energy Code Pre-Rulemaking
<b>TN #:</b>	253302
<b>Document Title:</b>	University of California, Irvine Comments - 4PVAV for Laboratories
<b>Description:</b>	N/A
<b>Filer:</b>	System
<b>Organization:</b>	University of California, Irvine
<b>Submitter Role:</b>	Public
<b>Submission Date:</b>	11/22/2023 4:37:44 PM
<b>Docketed Date:</b>	11/22/2023

*Comment Received From: University of California, Irvine*  
*Submitted On: 11/22/2023*  
*Docket Number: 22-BSTD-01*

**4PVAV for Laboratories**

*Additional submitted attachment is included below.*

We are in support of incorporating 4PVAV systems as a prescriptive requirement for energy efficient laboratories. However, the draft language for 140.9(c)5 Reheat Limitation for Laboratories presents some concerns with respect to execution in design, construction, and operation.

From my experience designing 4PVAV lab systems, we often furnish chilled and heating hot water coils at the DOAS units to temper the outside air to provide “neutral” air typically no colder than ~50°F and no warmer than ~74°F and let the supply air temperature “float” between those two limits when the outdoor air is within that range. This approach does not conflict with the proposed requirement to prohibit reheat. Please also consider that it’s often challenging to select 4PVAV combination coils to handle both heating and cooling loads. Taking more extreme entering air conditions at the inlet of the 4PVAV coils will make selections much more difficult and potentially less stable for real-world control.

Provisions for reasonable dehumidification parameters should also be included. There are climates within California that frequently get temperate, humid days that require dehumidification to mitigate the risk of mold within facilities.

Please consider adoption of the draft edits included as an attachment to this comment. These edits will help promote adoption of 4PVAV systems by enabling designers, builders, and owners make the most of the advantages that 4PVAV systems offer laboratory facilities.

## SECTION 100.1 – DEFINITIONS AND RULES OF CONSTRUCTION

**4-PIPE VAV.** A VAV system with terminal units that have both hot water and chilled water coils or a single switchover coil that can be fed with hot water or chilled water. A 2-pipe VAV system only has hot water coils at the zones and can result in significant reheat because the air handler mechanically cools the supply air to satisfy zones with high cooling loads and zones with low cooling loads must reheat the supply air to prevent overcooling. In a 4-pipe VAV system reheat can be eliminated because cooling for zones with high cooling loads can be provided by the zone cooling coils.

**140.9(c)5 Reheat Limitation.** Air handlers in buildings with greater than 20,000 cfm of laboratory exhaust that serve multiple space conditioning zones in laboratory spaces shall not ~~include mechanical cooling mechanically cool air handler supply air below 74°F and shall not heat air handler supply air above 50°F,~~ and each zone shall include heating and cooling capacity, such as *4-pipe VAV*, to prevent cooling at the air handler and reheating at the zones.

**Exception 1 to Section 140.9(c)5:** Additions or alterations to existing air handling systems serving existing zones without heating and cooling capacity.

**Exception 2 to Section 140.9(c)5:** Systems in Climate Zones 7 or 15 ~~or locations where the outdoor dew point temperature is greater than or equal to 66°F at the ASHRAE 2% annual dehumidification design condition.~~

**Exception 3 to Section 140.9(c)5:** Systems dedicated to vivarium spaces or to spaces classified as Biosafety Level 3 or higher.

**Exception 4 to Section 140.9(c)5:** Systems that:

1. Are located where the outdoor dew point temperature is greater than or equal to 64°F at the ASHRAE 2% annual dehumidification design condition, and
2. Include heating and cooling capacity at each zone, such as *4-pipe VAV*, and
3. Do not mechanically cool air handler supply air below 74°F when the outdoor dew point temperature is below 60°F