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Comments on Nonresidential HVAC Heat Pump Baseline Proposal

Additional submitted attachment is included below.

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To:	California Energy Commission
From:	Taylor Engineers
Subject:	Docket Number: 24-BSTD-01 15-Day Language
Date:	June 23, 2024

The changes made to section 140.4(a)3 between the 45-day language and 15-day language do not address the concerns we put forth in our comments on the 45-day language. We continue to be deeply concerned with the proposed heat pump baselines in 140.4(a)3 as written. The proposed changes significantly and unduly restrict prescriptive compliance options for HVAC systems in offices and schools. The narrowly defined baselines effectively exclude most multi-zone HVAC systems that are used in practice today and many all-electric systems that may provide better efficiency and lifecycle cost.

In addition to our prior 45-day language comments, we offer these additional comments:

140.4(a)3Aiii
The requirement for an AWHP system to produce no more than 105F leaving water temperature is not cost effective and leads to low deltaT systems with large piping and pump energy. The details of the supplemental LSC analysis provided are sparse and do not align with our analyses. Additionally, the requirement that most climate zones use only parallel fan-powered boxes cannot possibly be cost effective.

140.4(a)3Cii
The term “rated” is somewhat unclear in this new language, but it is also unclear what the point of this requirement is. A manufacturer is not going to allow their equipment to operate above the maximum leaving water temperature the product is capable of producing, so why is this requirement in the code? What is this statement intended to achieve? It is also overlapping and less stringent than the language in 140.4(a)3Aiii which limits the leaving water temperature to 105F.

140.4(a)3Ciii
The point of buffer tanks and increased system loop volume is to limit equipment cycling and the associated poor efficiency and temperature control, along with potential increased wear on the AWHP related to that cycling. Ultimately though, this is a function of the equipment installed and the building it is installed in. There is equipment out in the market that has very good turndown as well as potential applications within office buildings (e.g. large constant data center load) where sufficient turndown can be handled with modular or multiple equipment approaches. The requirement should refer to the turndown capability rather than a specific gal/ton of system loop volume. As AWHP technology improves and turndown improves, this prescriptive requirement will continue to be out of step, forcing owners to purchase buffer tanks that are doing little more than wasting energy and money.

140.4(a)3Civ
It is unclear where the supporting analysis is provided for this new language. It contradicts the longstanding prohibition on electric resistance heating limits and allows for a significant portion of heating capacity to be handled by a system with a COP of 1. Additionally, it is inconsistent that there is no allowance for electric resistance heating at the zone level, which is significantly more efficient than central electric resistance boilers because there are no associated hydronic loop thermal losses.

140.4(a)3D
The requirement for DOAS and zonal systems that shut off in deadband means it will be impossible for the HVAC system alone to meet the equivalent clean air rates in ASHRAE Standard 241 “Control of Infectious Aerosols”. Separate systems, like portable air cleaners, will be required, which are expensive, noisy, high maintenance, and architecturally problematic, particularly in schools. The prescribed systems are the worst possible from a disease transmission standpoint.

Exception 8 to Section 140.4(e)1
VRF and FPFCs no longer have any economizer requirement nor do they have to compensate for this lack. This exception needs justification. Prior LCCA has shown that you need the enhanced DOAS (same section, Exception 6) to offset the lack of economizer. Furthermore, this enhanced DOAS requires that ventilation zones have pressure independent air valves (to perform the partial economizer logic). Without this air valve, DCV would not be required except on zones with huge outdoor air needs >3000 cfm of which there are few.