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Subject: Taylor Engineering Comments on Proposed Revisions to the California Building Energy Efficiency Standards. Docket No. 15-BSTD-01

Please see below for our comments on the 45-day language:

1. Exception 3 to Section 110.2(a): "Equipment primarily serving exempt or covered process loads."
    a. Why was this exception added?
    b. We recommend deleting this new exception.
    c. Rationale: This section sets mandatory minimum equipment efficiency requirements. The newly added exception provides an exemption for equipment that serves process loads, whether exempt or covered. Exempt process are already exempt and do not need another exemption here. Covered processes typically have higher loads than non-processes and do not deserve an exemption. Also, there is no equivalent exemption in ASHRAE Std. 90.1.
2. Section 110.2(c): "All ~~unitary~~ heating or cooling systems~~, including heat pumps,~~ not controlled by a central energy management control system (EMCS) shall have a setback thermostat."
    a. We recommended restoring the word "unitary"
    b. Rationale: Deleting this word changes the meaning of this requirement. The word "unitary" is needed to prevent adding a requirement for setback where pneumatic VAV box thermostats are allowed.
3. Section 110.3(c) 7: Isolation valve. Instantaneous water heaters with an input rating greater than 6.8 kBTU/hr shall have isolation valves on both the cold water supply and the hot water pipe leaving the water heater, and hose bibbs or other fittings on each valve for flushing the water heater when the valves are closed.
    a. We recommend deleting the proposed changes and keeping the original language as-is.
    b. Rationale: This is not an energy issue and does not belong in the energy code
4. Section 120.2(b) 4: "Thermostatic controls for all ~~unitary single zone,~~ air conditioners, heat pumps, and furnaces, shall comply with the requirements of Section 110.2(c) and Reference Joint Appendix JA5 or, if equipped with DDC to the Zone level, with the Automatic Demand Controls of Section 120.2 (h)".

Exception 2 to Section 120.2(b) 4: "…wood stoves, gas furnaces, package terminal air conditioners, package terminal heat pumps, room air conditioners,…"

a. We recommend revising Section 120.2(b) 4 to the following: "Thermostatic controls for all single zone air conditioners and heat pumps shall comply with the requirements of Reference Joint Appendix JA5."

b. We recommend revising Exception 2 to Section 120.2(b) as follows "package terminal air conditioners, package terminal heat pumps"

c. Rationale:

i. Restore "single zone" because deleting this phrase changes the meaning of the requirement and expands the applicability to multiple zone systems

ii. Delete "furnaces" from the requirement because they are not electrical equipment

iii. Delete the reference "Section 110.2 (c)" because it is a duplicate as Section 110.2 (c) already requires setback capability

iv. Delete "gas furnaces" in the language for Exception 2 as we recommend instead deleting "furnaces" from Section 120.2(b) 4.

v. The only thing you might want to keep in Exception 2 besides PTAC/PTHP is room air conditioners. All the other things in there no longer are covered by the requirement so don't need exceptions.

vi. Delete ", or, if equipped with DDC to the Zone level, with the Automatic Demand Controls of Section 120.2 (h)" because section 120.2 (h) already exists and requires demand controls for systems with DDC to zone.

5. Section 120.2(f): " Outdoor air supply and exhaust equipment shall be installed with dampers that:…

2. Automatically close during unoccupied periods; and…

3. Remain closed during setback heating and cooling as specified by 120(e)2…"

a. We recommend revising the language of this section so that it does not apply to unitary air conditioners.

b. Rationale: In order to achieve the described features, a unit would need to have a controller that has separate input signals for setback (or preoccupancy) and occupied/unoccupied modes. Typical packaged units only accept a single signal to run based on occupied vs. unoccupied mode and do not have the capability to accept a command for separately controlling ventilation. For typical package units, the controller cannot meet the requirements in part 2 for operation in pre-occupancy mode without ventilation and in part 3 for operation in setback mode without ventilation.

6. Section 120.2(i): "Economizer Fault Detection and Diagnostics (FDD): All newly installed air-cooled ~~unitary~~ packaged direct expansion units with an air handler~~, equipped with an~~

~~economizer and with~~ mechanical cooling capacity ~~at AHRI conditions of~~ greater than or equal to 54,000 Btu/hr, ~~equipped with an air economizer,~~ shall include a standalone or integrated Fault Detection and Diagnostics (FDD) system in accordance with Subsections 120.2(i)1 through 120.2(i)~~9~~8."

a. We recommend revising the sentence to "Any newly installed cooling air handler that has a design total mechanical cooling capacity over 54,000 Btu/hr shall include a standalone or integrated Fault Detection and Diagnostics system in accordance with Subsections 120.2(i)1 through 120.2(i)8."

b. Rationale: The requirement should apply to chilled water systems as well as packaged systems to be consistent with the applicability of the prescriptive economizer requirements in Section 140.4 .

7. Section 120.2(k): Optimum Start/Stop Controls. "Space conditioning systems with DDC to the zone level shall have optimum start/stop controls. These controls shall have access to space temperature, ambient air temperature and historical thermal lag profiles of each controlled zone"

a. We recommended adopting the 90.1 language: "Space conditioning systems with DDC to the zone level shall have optimum start/stop controls. The control algorithm shall, as a minimum, be a function of the difference between space temperature and occupied setpoint, the outdoor air temperature, and the amount of time prior to scheduled occupancy. Mass radiant floor slab systems shall incorporate floor temperature into the optimum start algorithm"

b. Rationale: The proposed revisions ask for "historical thermal lag profiles of each controlled zone". This requirement is vague. It is not clear if any of the major HVAC controls manufacturers have this ability. 90.1 is clearer and is available from all major HVAC controls manufacturers.

8. Section 120.3 (a) 3: "Service water-heating systems. All recirculating sections, all piping in electric trace tape systems, and the first 8 feet of hot and cold water pipes from the storage tank" and Table 120.3-A.

a. We recommend adopting 90.1 language use for both Section 120.3(a)3 and Table 120.3-A: " a. recirculating system piping, including the supply and return piping of a circulating tank type water heater; b. the first 8 ft of outlet piping for a constant temperature nonrecirculating storage system; c. the inlet piping between the storage tank and a heat trap in a nonrecirculating storage system; d. piping that is externally heated (such as heat trace or impedance heating)"

b. Rationale: The 90.1 language has already been vetted by an ANSI process and is more specific with respect to referencing heat traps and external heating.

9. Section 140.4(e)1: "An air economizer capable of modulating outside-air dampers to 100 percent open and return-air dampers to ~~supply~~ 100 percent ~~of the design supply air quantity as outside-air~~ closed;"

a. We recommend eliminating the proposed changes and keeping the original language as-is.

b. Rationale: The original language required air economizers sized for the design supply airflow. The proposed revisions significantly change the meaning of this requirement. Instead of requiring that the economizer dampers be sized for the full airflow, any outside air damper, of any size, could meet the requirement, as long as it is capable of opening to 100% open (which every damper can do). So instead of stipulating a minimum economizer size, the revised language would allow an economizer of any size to meet this requirement. This is a big mistake.

10. Section 120.7 (b): Wall insulation. Mandatory insulation requirement.

    a. We recommend reducing mandatory insulation requirement to a level such that metal studs with cavity insulation is allowed (i.e. continuous exterior insulation is not required).

    b. Rationale: 1) Insulation can be modeled easily so it can be traded off using the performance method; 2) in some applications, the cost of continuous exterior insulation is high, so it becomes less cost effective than other energy saving measures that could be implemented instead. Designers should be able to trade off exterior insulation with other measures using the performance approach.

11. The prescriptive requirement for service water heating systems for high-rise residential and hotel/motel occupancies in Section 140.5(b) references Section 150.1(c)8 (which is for low-rise residential), where it requires, in B.iii, "A solar water-heating system meeting the installation criteria specified in Reference Residential Appendix RA4 and with a minimum solar savings fraction of 0.20 in Climate Zones 1 through 9 or a minimum solar savings fraction of 0.35 in Climate Zones 10 through 16."

    a. We recommend revising the solar saving fraction requirement to 0.20 divided by the number of floors in Climate Zones 1 through 9, and 0.35 divided by the number of floors in Climate Zones 10 through 16 for high-rise buildings

    b. Rationale: Prescriptive requirements for low-rise residential buildings cannot be directly applied to high-rise residential buildings. It is impossible for a 40 story high rise condo building to achieve a solar fraction of 0.20 or 0.35 given the large water heating load and the relatively small roof footprint. Similarly, it is unfair to compare such a building to a baseline building that has this fraction using the performance approach. The required solar fraction must be a function of the number of stories.

12. Section 120.8 Nonresidential Building Commissioning: "~~For all new n~~Nonresidential buildings…"

    a. We recommend restoring the word "new" or clarifying the language to clearly define the applicable scope.

    b. Rationale: Deleting the word "new" implies by omission that commissioning is required for all building systems covered by Sections 110 through 140, whether the building is new or existing. For an alteration that only covers a small portion of the

building, the revised language could be interpreted to require commissioning of the entire MEP system.