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California Energy Commission

DOCKETED

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Subject: Adoption of 15-Day Language for the 2016 Energy Efficiency Building Standards.
Docket No. 15-BSTD-01

Please see below for Taylor Engineering's comments on the 15-day language:

1. 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
2. Section 120.2: ~~Space conditioning systems~~ Nonresidential, high-rise residential, and hotel/motel buildings shall be installed with controls that comply with the applicable requirements of Subsections (a) through (i) Sections 120.2(a) through 120.2(i).
 - a. The sentence should be changed to reference Sections 120.2(a) through 120.2(k) to account for the sections on DDC and optimum start/stop controls.
3. Section 120.2(j): Direct Digital Controls (DDC). Direct Digital Controls to the zone shall be provided as specified by Table 120.2-A.
 - a. We recommend deleting the added phrase "to the zone".
 - b. Rationale: The requirements in this section apply more generally than just zone-level controls. For example, the required controls for a new chilled water plant do not directly involve zone-level controls.
4. Table 120.3-A: Space heating, Hot Water systems (steam, steam condensate and hot water) and Service Water Heating Systems (recirculating sections, all piping in electric trace tape systems, and the first 8 feet of piping from the storage tank for nonrecirculating systems)
 - a. We recommend deleting the underlined phrase that was added in the 45-day language.
 - b. Rationale: The language in Section 120.3(a)3 was revised in the 15-day language to follow the approach in 90.1 but the corresponding language in Table 120.3-A remains unchanged. The two references to where pipe insulation is required in service water heating systems are conflicting. For example, the table cites electric trace tape whereas the text cites piping that is externally heated, which is more broadly applicable. The required applications are already listed in Section 120.3(a)3 and need



not be repeated in the table. Doing so may result in conflicts and contradictions as is the case here.

5. Section 120.3(b)1: Insulation protection for mandatory pipe insulation. “Insulation exposed to weather shall ~~be suitable for outdoor service by either being rated by the manufacturer for outdoor use or by being covered e.g., protected by aluminum, sheet metal, painted canvas, or plastic cover. Cellular foam insulation shall be protected as above or painted with a coating that~~ be installed with a cover suitable for outdoor service. The cover shall be ~~is~~ water retardant and provides shielding from solar radiation that can cause degradation of the material.
 - a. We recommend restoring the original language.
 - b. Rationale: The original language allowed different methods of protecting exposed pipe insulation to account for different types of insulation. The new language only allows covers, which may not be necessary or cost effective for all types of insulation. Elastomeric and cellular glass insulation typically only need a painted liquid coating for protection and should not require an additional cover.
6. Section 120.3(b)2: Vapor retarder for mandatory pipe insulation. “Insulation covering chilled water piping and refrigerant suction piping located outside the conditioned space shall ~~include a vapor retardant located outside the insulation (unless the insulation is inherently vapor retardant),~~ have a Class I or Class II vapor retarder. All penetrations and joints of which shall be sealed.”
 - a. We recommend restoring the original language.
 - b. Rationale: The original language accounted for the intrinsic properties of different types of pipe insulation by not requiring a vapor retardant for insulations that are inherently vapor retarding such as elastomeric and cellular glass insulation. The new language simply requires a vapor retarder for all mandatory pipe insulation, even though it unlikely to be cost effective or beneficial for elastomeric and cellular glass insulation.
7. Section 120.7 (b)2: Mandatory requirement for wall insulation for metal framed walls.
 - a. The required U-factor for metal framed walls has been reduced to 0.151 in the 15-day language. This corresponds to R-13 cavity insulation with R-2 continuous exterior insulation (according to JA Table 4.3.3). We strongly recommend further reducing the mandatory insulation requirement to a level of 0.178 such that there is at least an option to avoid continuous insulation.
 - 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. However, relaxing the mandatory U-value to 0.178 at least provides more design flexibility since it can be achieved with either 6-inch cavity insulation or 4-inch cavity insulation plus continuous insulation.



8. Section 130.5: Nonresidential, high-rise residential and hotel/motel buildings shall comply with the applicable requirements of Sections 130.5(a) through 130.5(f).
 - a. The sentence should be changed to reference Sections 130.5(a) through 130.5(e) to account for the sections on demand responsive controls and equipment.
9. 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 strongly recommend revising the solar saving fraction requirement for high-rise residential 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. The required solar fraction must be a function of the number of stories. This requirement alone may force all high-rise residential to use the performance compliance approach (the ACM manual does not require the standard model to include solar thermal).
10. Section 150.0(i): Thermostats. All unitary heating or cooling systems, including heat pumps, not controlled by a central energy management control system (EMCS) shall have a setback thermostat, as specified in Heating systems shall be equipped with thermostats that meet the requirements of Section 110.2(c).
 - a. We recommend deleting the word “unitary”.
 - b. Rationale: The original requirement for setback thermostats applied only to heating systems (of any type). The new language only applies to unitary systems, whether heating or cooling, but no longer applies to gas-fired heaters. The word “unitary” must be deleted to ensure that the requirement still applies to all types of heating systems.
11. Section 150.0(m)1: “Portions of supply-air and return-air ducts and plenums of a space heating or cooling system shall either be insulated to a minimum installed level of R-6.0 (or any higher level required by CMC Section 605.0) or a minimum installed level of R-4.2 when be enclosed entirely in directly conditioned space...”
 - a. We strongly recommend reverting the language in this section to the original language, or to limit the requirement to only where heat gain or heat loss will increase energy use as is done in the CMC.
 - b. Rationale: The revised language requires supply and return ducts that are fully within the conditioned space to be insulated to a minimum of R-4.2. This will not save energy. Nominally, this section appears to simply mirror the applicable requirements



in Chapter 6 of the California Mechanical Code. However, CMC 604.1 includes an exception for ducts that are located in conditioned spaces where heat gain or heat loss will not increase energy use. See below.

604.0 Insulation of Ducts.

604.1 General. Supply-air ducts, return-air ducts, and plenums of a heating or cooling system shall be insulated to achieve the minimum thermal (R) value in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible. *[OSH PD 1, 2, 3 & 4] Cold air ducts shall be insulated wherever necessary or to prevent condensation.*

Exceptions:

- (1) Factory-installed plenums, casings, or ductwork furnished as a part of HVAC equipment tested and rated in accordance with approved energy efficiency standards.
- (2) Ducts or plenums located in conditioned spaces where heat gain or heat loss will not increase energy use.
- (3) For runouts less than 10 feet (3048 mm) in length to air terminals or air outlets, the rated R value of insulation need not exceed R-3.5 (R-0.6).

12. Section 150.0(m)13.A: Static Pressure Probe. ~~Have a hole for the placement of~~ Placement of a static pressure probe (HSPP), or a permanently installed static pressure probe (PSPP) in the supply plenum downstream of the air conditioning evaporator coil.

- a. We recommend restoring the original phrase: “Have a hold for the placement of a static pressure...”
- b. The original language only required a hole to allow for measurement of static pressure. It is unclear what the revised language is intended to require but it seems to now require not just a hole but the static pressure probe as well. The revised language is also grammatically awkward. Previously, the language flowed from the parent paragraph to each requirement (e.g. “...systems that utilize forced air ducts to supply cooling to an occupiable space shall: have a hole...” and “...shall: demonstrate...”). The new language does not flow correctly anymore. Also, the revision makes it so that there is no definition (whether explicit or implied) for the acronym HSPP.

13. Section titles

- a. We recommend revising the section titles to clearly distinguish whether requirements are mandatory, prescriptive or performance.
- b. Rationale: The section titles are inconsistent in the use of the words “Mandatory” vs “Prescriptive”. For example, Section 120.1 is titled “Requirements for Ventilation” whereas 120.7 is titled “Mandatory Insulation Requirements” even though both sections are mandatory. Similarly, Section 140.6 is titled “Prescriptive Requirements for Indoor Lighting” whereas 140.7 is titled “Requirements for Outdoor lighting” but both sections contain prescriptive requirements. It would improve the clarity of the standard if the section titles were consistent.