

DOCKETED

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Comments on insulation requirements for ducts in conditioned space

Additional submitted attachment is included below.



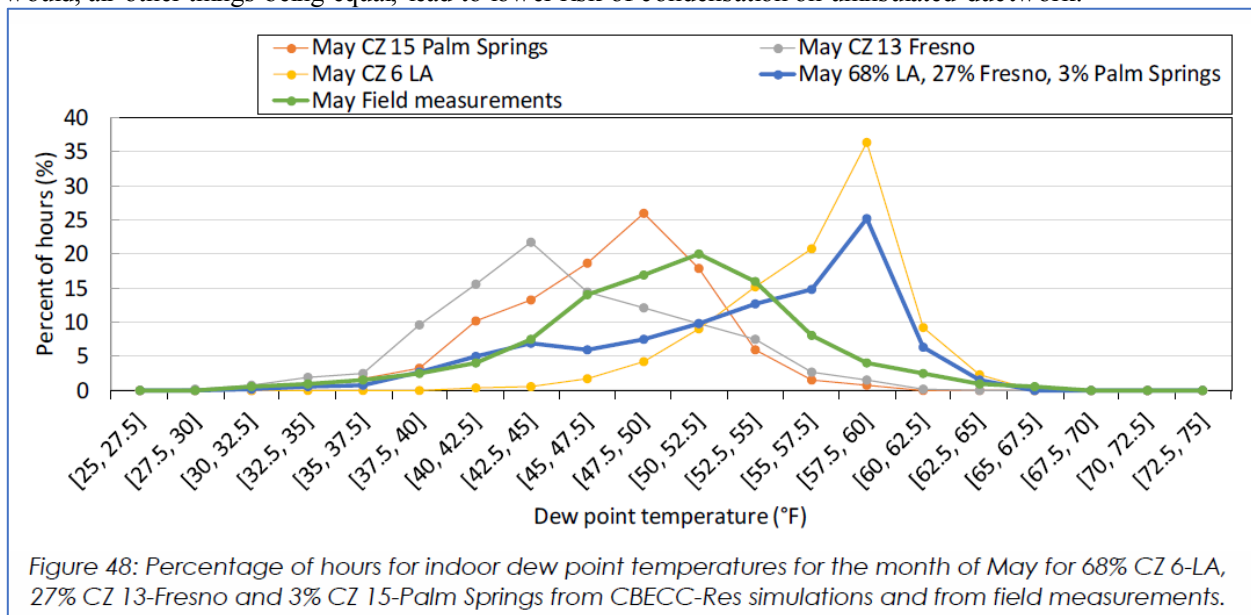
June 29th, 2021

California Energy Commission
1516 Ninth Street, Docket Office, MS-4
Sacramento, CA. 95814
docket@energy.ca.gov,

Dear Commissioners,

Re: Docket 21-BSTD-01 2022 Energy Code Update Rulemaking

During development of draft language for the 2022 Express Terms, consideration of the use of uninsulated ducts in conditioned space has been informed by a report¹ (“WCEC report”) prepared by the Western Cooling Efficiency Center at UC Davis of modeling and calculations undertaken to investigate this issue. The WCEC report concludes that while condensation is possible on uninsulated ducts in chases, the quantity of condensation is sufficiently small that it is unlikely to lead to mold or damage. The WCEC report also notes that the modeled dew point temperatures are likely higher than real world data which would result in the models overestimating the risk of condensation. See for example figure 48 of the WCEC report, reproduced below. The green and blue data show field data and modeled results for a similar set of homes in May. The field data clearly shows a lower distribution of dewpoints, which would, all other things being equal, lead to lower risk of condensation on uninsulated ductwork.



Because the use of uninsulated ducts has not been common in California, there is limited field data available regarding condensation on uninsulated ducts. Most studies of issues surrounding indoor moisture make no mention of ducts and provide only average temperatures and humidity levels, meaning it is not possible to derive useful information relating to condensation on ducts. A limited number of studies have considered dewpoint temperature in humid climates as it might relate to uninsulated ductwork.

The Florida Solar Energy Center² monitored a factory-built home for a three-month period (June -August). The aim of the study was to determine whether ducts could be run without insulation in interior walls. The thermostat setpoint was in the low 70s F, and results showed that the average dewpoint temperature was 49.7F during the test

¹ Analysis of Duct Insulation Requirements for Ducts in Conditioned and Indirectly Conditioned Spaces

² <http://www.fsec.ucf.edu/en/publications/pdf/FSEC-PF-444-08.pdf>

period. The average outdoor temperature was 88F. This test showed that the ambient temperature remained below the supply plenum temperature throughout the test period, meaning that there was no risk of condensation. A study of homes in New Orleans, LA, carried out for NREL by the Building Science Corporation³ compared the performance of homes with and without supplemental dehumidification over the course of approximately 13 months. For homes without supplemental dehumidification, the dewpoint rose above 60F for less than 10% of the time, and above 65F for approximately 1% of the time. While this study did not include data on condensation on ducts, it is worth noting that the time spent at elevated dewpoints is considerably lower than in the models used in the WCEC study – Figure 30 from that study (reproduced below) shows the indoor dew point temperature during the cooling period spending close to 50% of the time above 60F. This figure is from the climate zone which showed the highest likelihood of condensation. The difference between modeled and actual data on dewpoint temperatures suggests that the modeling may underestimate the dehumidification caused by air-conditioning. The possible reasons for any such discrepancy are outside the scope of this comment.

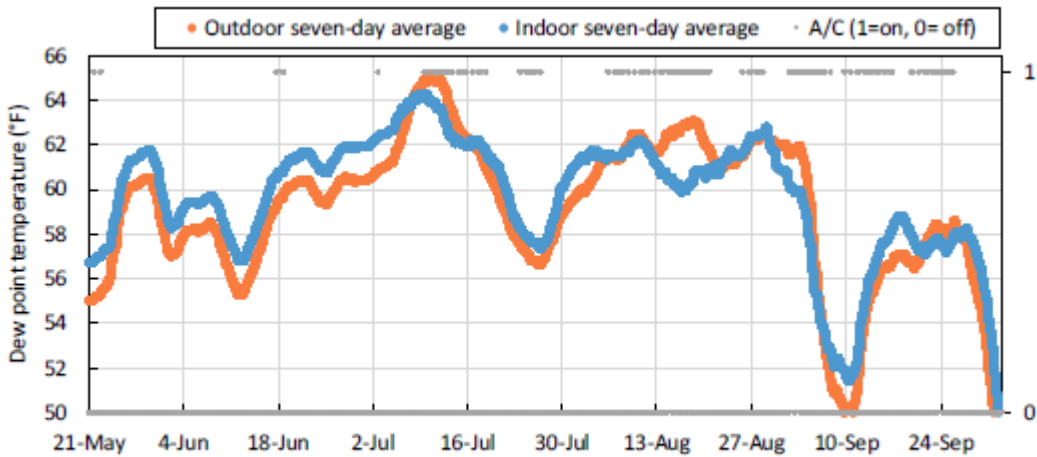


Figure 30: Seven-day moving average indoor (room) and outdoor dew point temperatures for CZ 9 Burbank for summer. Air conditioner operation (on or off) is shown on the secondary axis.

In addition to these studies, reports have been submitted to the docket by Rheia LLC (TN# 238584), showing an analysis of both field and lab data. These reports reinforce the results of the studies cited here, showing that under typical conditions, the risk of condensation is negligible.

When considering the data from Rheia’s tests, the studies noted here, submissions to the docket from builders experienced in the use of uninsulated ducts (TN#s 238321, 238267, 238263, 238261, 238258, 238239, and 238212), and ConSol’s previous comments submitted to this docket (TN#s 238140 and 238388), it remains ConSol’s position that the requirement for insulation on ducts in conditioned space is unnecessary and should not be included in the 2022 code.

Sincerely,

William Allen, PhD
Senior Technical Consultant



³ <https://www.nrel.gov/docs/fy15osti/62531.pdf>