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Madison Air Response to 2028 Energy Code Pre-Rulemaking

Additional submitted attachment is included below.

Therma-Stor® LLC

November 5, 2026

CEC Docket Number: 25-BSTD-03

Project Title: Pre-Rulemaking Draft Regulatory Text for the 2028 Energy Code

Subject: Comments on Section 908 of the 2028 Energy Code Pre-Rulemaking – Controlled Environment Horticulture

To: Michael Sokol, Director for Efficiency Division of the California Energy Commission

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Director Sokol:

On behalf of Therma-Stor, I respectfully submit these comments in response to the *2028 Energy Code Pre-Rulemaking* published in October of 2026.

Therma-Stor (TS), a Madison Air company, is one of the largest and most successful companies in the manufacturing of HVAC equipment for the Controlled Environment Horticulture (CEH) market. Through the Quest and Anden brands, Therma-Stor offers space conditioning equipment to the CEH market that would be impacted by the changes proposed in this pre-rulemaking.

I would like to start by thanking the authors of the original CASE report, their Project Management, Project Support and funders for the work they have put into developing the *Controlled Environment Horticulture Final CASE Report*. Likewise, I also thank CEC staff for their efforts to pull that information into the pre-rulemaking. This represents a significant step forward in advancing energy efficiency for a market that consumes significantly higher amounts of energy per square foot of facility than nearly any other facility type.

With that in mind, I have the following suggestions and observations on the proposed code language found in section 908 – *Controlled Environment Horticulture* and related definitions found in section 201 - *Definitions*.

Clarification of the descriptions of the two Indoor Growing Spaces identified for dehumidification equipment requirements [Section 908.1.1 & 908.1.6.2]

I request clarification of the wording that defines the two spaces where dehumidification equipment selection is regulated.

In section 908.1.1, my understanding is that the space must meet the criteria of:

- Building with less than 5,000 ft^2 of canopy area ***AND***
- Horticultural lighting power density less than 30 Watts/ft^2

This appears to be a significant change from section 908.1.1 in the *Controlled Environment Horticulture Final CASE Report* where it defined this space as 5,000 ft^2 of canopy area ***OR*** horticultural lighting power density less than 30 Watts/ft^2.

Likewise, in section 908.1.6.2, the second space criteria is defined as:

- Building with greater than or equal to 5,000 ft^2 of canopy area ***AND***
- Horticultural lighting power density greater than or equal to 30 Watts/ft^2

This second space criteria agrees with the *CEH Final CASE Report*.

Within the CEH industry, there are very few plants, outside of cannabis, that require a horticultural lighting power density greater than or equal to 30 Watts/ft^2. Therefore, the criteria established in the *CEH Final CASE Report* allowed smaller cannabis operations to use the dehumidification equipment specifications of 908.1.1. The current wording restricts all cannabis operations into the dehumidification requirements of 908.1.6.2.

If the draft were to pass as currently written, I would consider this an unnecessary burden upon smaller growers and result in an increase in energy consumption. The integrated space conditioning systems typically used by the larger growers are rarely small enough for a grower with a cannabis facility less than 5,000 ft^2 of canopy area, nor could most afford it. This means they will turn to packaged (i.e. rooftop) units with hot gas reheat coils. Quest can provide plenty of information showing that a standalone dehumidifier provides higher efficiency dehumidification than a packaged unit with hot gas reheat coils.

I also noted that the word “spaces” from the *CEH Final CASE Report* in both 908.1.1 and 908.1.6.2 has been changed to the word “building”. I understand that “spaces” may have been too nebulous, but use of the word “building” does not solve all issues.

For example, there are facilities that are built with multiple rooms that are leased out to several different cannabis license holders. Though each license holder may have less than 5,000 ft^2 of canopy area, the entire building could easily exceed this number. Likewise, a larger license holder could simply build multiple buildings, each holding less than 5,000 ft^2 of canopy area.

Proposed Revisions

1. In section 908.1.1, replace the words, “Dehumidification *equipment* in *Indoor Growing* spaces in *buildings…*” with “Dehumidification *equipment in Indoor growing space-conditioning systems* serving spaces in all *buildings operated by a*

single cannabis license holder or the sum total of all spaces in a single building used to grow any non-cannabis crop…

2. In section 908.1.6.2, replace the words, "*Indoor growing space-conditioning systems* serving spaces in *buildings…" with "Indoor growing space-conditioning systems* serving spaces in all *buildings operated by a single cannabis license holder or the sum total of all spaces in a single building used to grow any non-cannabis crop…"*
3. In section 908.1.1, remove the words, "…with less than 5,000 square feet of total plant canopy area served by horticultural lighting with lighting power density less than 30 Watts per square foot of plant canopy area…" and return it to the wording from the original *CEH Final CASE Report* of "…with less than 5000 square feet of total plant canopy area or with lighting power density less than 30 Watts per square foot of plant canopy area…"

The Two Definitions Proposed for "Dehumidifiers"

Two new definitions have been proposed in section 201 for dehumidifiers: *Consumer Dehumidifier* and *Commercial Dehumidifier*. As a manufacturer of both types of dehumidifiers, I support the creation of these two definitions but have a few suggestions for clarification of the two categories.

As I understand the definition, a consumer dehumidifier must have the following properties:

- Single phase *and*
- Supply voltage less than 208V *and*
- Rated dehumidification capacity less than one or more of the following capacities at the noted incoming air conditions:
    - 185 PPD at 80F/60% *or*
    - 155 PPD at 73F/60% *or*
    - 125 PPD at 65F/60%

Likewise, I understand the definition of a commercial dehumidifier must have **ONE** of the following properties:

- Three phase *or*
- Supply voltage of 208V or higher *or*
- Rated dehumidification capacity equal to or greater than one or more of the following capacities at the noted incoming air conditions:
    - 185 PPD at 80F/60% *or*
    - 155 PPD at 73F/60% *or*
    - 125 PPD at 65F/60%

I would consider these definitions to be unnecessarily complex and imparts an unnecessary test burden upon manufacturers for the following reasons:

- Based upon the definition of "consumer dehumidifier", coupled with the testing and efficiency requirements listed in 908.1.1, it is clear the intention of this definition is to mirror the requirements for a consumer product dehumidifier as defined in 10 CFR 430. This leads us to a concern that this definition and subsequent efficiency requirements may be considered preemption of federal regulations.
- Of the three incoming air conditions listed in the definition of "consumer dehumidifier", only the condition of "65°F dry-bulb temperature and 60 percent relative humidity" is a current requirement of 10 CFR 430. Inclusion of these other two conditions would require manufacturers to:
    - Follow the testing process as defined in 10 CFR 430 Appendix X1 at the incoming air conditions of 80F/60% and 0.0 in. w.c. and 73F/60% in. w.c.
    - Publish this information on their website, print it on the side of the product packaging or in some other way convey this information to a potential customer since this information is not currently available in the DOE's CCMS database or California's MAEDbS database.
- Of the three incoming air conditions listed in the definition of "commercial dehumidifier", only the condition of 80F/60% and 0.0 in. w.c is a required testing condition of JA19. This would result in manufacturers running 5 separate tests to meet all requirements.
- It should also be noted that there are dehumidifiers on the market that meet the draft definition of a "consumer dehumidifier", but are not considered "consumer products" under 10 CFR 430 because they are built for the commercial market.

It should also be noted that the origin of "185 pints per day at 80°F dry-bulb temperature and 60 percent relative humidity" most likely has its origins in the "ENERGY STAR® Program Requirements for Dehumidifiers", Version 4.0 (finalized 2016). Likewise, the origin of "155 pints per day at 73°F dry-bulb temperature and 60 percent relative humidity" most likely has its origin in the same program requirements, Version 5.0 (finalized 2019). In the current program requirements, Version 6.0 (finalized 2024), there is no longer a capacity requirement listed. Instead, the wording simply says, "Consumer products that meet the definition of a dehumidifier as specified herein…"

Proposed Revisions

I will offer the following suggestions as ways to clarify and/or improve the definitions. Implementation of these suggestions are independent of each other.

1. Given that "Consumer Dehumidifier" is very close to the 10 CFR 430.2 definition "Consumer Product Dehumidifier" I would suggest one of the following revised definitions:
    a. DEHUMIDIFIER, CONSUMER: a dehumidifier that meets the requirements of 10 CFR 430 and is listed in the U.S. Department of Energy's Compliance Certification Database.
    b. DEHUMIDIFIER, CONSUMER: a dehumidifier that meets the requirements of 10 CFR 430 and is listed in the California Energy Commission's MAEDbS database.
2. If one of the two proposed definitions were used for "Consumer Dehumidifier", I would then suggest the following definition for "Commercial Dehumidifier":
    a. DEHUMIDIFIER, COMMERCIAL: an appliance that meets the definition of "dehumidifier" that is not a Consumer Dehumidifier.
3. If the CEC prefers to stick with a form of the current definitions of "Consumer Dehumidifier" and "Commercial Dehumidifier", I would recommend using only the capacity of 125 ppd at 65F/60%; 0.0 in. w.c. This reduces the testing and publication burden on manufacturers. Consumer product dehumidifier manufactures could use information already required by 10 CFR 430. Commercial dehumidifier manufactures would only be required to test to the three conditions listed in JA19.

Clarification of Heat/Reheat Recovery Requirements

Section 201 defines "Reheat Capacity" as:

> REHEAT CAPACITY is the amount of energy introduced into the airstream, downstream of the cooling and dehumidification coil, for the purposes of meeting the required air supply temperature setpoints.

Section 2.2.1.3.2 states:

> Modulate heat recovery between 0% and 90% of heat of rejection of the primary system, as needed to meet supply air setpoints;

Section 908.1.6.2.3 states:

> 2.3. Heat recovery. *Dehumidifiers* shall be capable of meeting a recovered *reheat capacity* ratio of at least 0.9 as demonstrated through manufacturer data or engineering calculations.

I am seeking clarification of these three statements.

First, Section 2.3 sets requirements for the manufacture to demonstrate a device's "reheat capacity ratio", except the standard has only defined "reheat capacity". Please define in the standard what are the two values used in determining the "ratio". Is it the amount of heat the appliance can recover for the purpose of reheating over the total heat rejected by the appliance? Or is there a different definition?

Second, a dehumidifier would, normally, reject all of its heat to the space, including any work put into the fan and compressor. This would naturally result in a "reheat capacity ratio" in excess of 1.0. Likewise, 908.1.6.2.2.1.3.2 requires integrated space conditioning equipment to be capable of 90% heat recovery. This only leaves a dehumidifier that does not reject all of its heat to the space as falling under this requirement. To capture all of this, would the words "Dehumidification equipment" be a better fit in the place of "Dehumidifiers" in section 908.1.6.2.3?

Requests

1. Define "Reheat Capacity Ratio".
2. Clarify 908.1.6.2.3 if "dehumidifiers", as in the newly defined consumer and commercial dehumidifiers, was supposed to indicate any space conditioning equipment built to dehumidify the air.

Humidity and Temperature Sensor Placement

Section 908.1.6.2.5.1 requires humidity and temperature sensors be "…co-located within the plant canopy." I feel this is too restrictive for many growers.

While I understand the intention is to get the most accurate information available by placing the sensors amongst the canopy, this will become an unnecessary burden on most growers for the following reasons:

- The ideal location would be within the upper canopy of the plants, but as the plants grow, this location will change. If the sensors are not moved, they would eventually end up in the lower sections of the canopy where the microclimate is typically more humid. This would result in excessive operation of the dehumidification equipment.
- Even if the sensor was moved to keep it in the upper areas of the canopy, the sensors could be damaged by pesticides, herbicides, water and other things sprayed on the plant.

Proposed Revisions

I suggest replacing, "…co-located within the plant canopy," with "…co-located in the plant canopy or within one foot of the top of the plant canopy."

Clarification of Section 908.1.6.2.6

I request that Section 908.1.6.2.6 be clarified. As written, some readers interpret the wording to indicate that a commercial dehumidifier that reject all heat withing the building envelope can only be used if there is a need for supplemental heat in the space. That is the case in the first portion, namely, "…during periods when all waste heat can be used in the space…"

The second portion of this states, "…or when other indoor growing space-conditioning systems cannot satisfy 100% of cooling, heating, and dehumidification loads." Given that 908.1.6.2.2.1.2 only requires integrated systems to be designed to meet at least 80% of peak latent and sensible loads, it is my assumption this means that supplemental dehumidification in the form of "commercial dehumidifiers" can be installed with an integrated space conditioning system and they can be used when the system is not meeting 100% of the dehumidification load due to lack of latent capacity.

Proposed Revisions

To clarify this misunderstanding, I would suggest the following revisions:

1. In section 908.1.6.2.6, revise the wording, "…when other indoor growing space-conditioning systems cannot satisfy 100% of cooling, heating, and dehumidification loads…" to, "…when other indoor growing space-conditioning systems cannot satisfy 100% of the dehumidification load while operating at 100% of its cooling capacity."

Appendix JA19 – Qualification Requirements for Commercial Dehumidifiers

I am satisfied with the language and test conditions listed in Appendix JA19 for commercial dehumidifiers. I will note that the test condition listed in JA19.2.1.3 was 73F / 50% RH; 0.00 in. W.C., but it is now 73F / 60% RH; 0.00 in. W.C. Given that it is listed 50% later in the document, I ask that you correct 1.3 back to 50%.

Proposed Revisions

Change the wording in JA19.2.1.3 from "73F / 60% RH; 0.00 in. W.C." to "73F / 50% RH; 0.00 in. W.C."

Therma-Stor® LLC

Again, I appreciate the work of the California Energy Commission, the CASE team and many other have put into this pre-rulemaking draft regulatory text. I also appreciate the opportunity to provide comments. If I can provide any additional information, please let me know.

Sincerely,



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