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Anden Comments on CEH Dehumidifier Standards

Please see attached comments on Section 120.6(h) relating to the standards used for Dehumidifier Testing

Additional submitted attachment is included below.

6/9/2021

To the California Energy Commission,

On behalf of Anden, a division of Research Products Corporation, we write to you to express concerns about the proposed changes to Title 24 Part 6 (herein referred to as the “Terms”) on dehumidification systems in CEH facilities.

Based in Madison, Wis., Anden supplies environmental control solutions for indoor professional cultivation. Anden offers a complete lineup of grow-optimized dehumidifiers at capacities up to 710 pints per day as well as humidifiers and precision controls. Anden products are designed to achieve humidity balance and maximum growth potential with components proven to perform in the extreme conditions of a grow room environment.

On the recent proposed Terms, while we fully endorse the commission’s move towards standardized testing conditions and minimum Integrated Energy Factors (“IEF”), we wish to highlight a concern with the test conditions incorporated in Section 120.6(h) of the Terms:

➔ Appendix **X1** to Subpart B of 10 CFR Part 430 (herein referred to as “Appendix X1”).

We believe the commission should reevaluate this section because Appendix X1’s classification of units as either whole-home or portable dehumidifiers make their test methods seemingly incompatible with the CEH industry and the stated intent of the CASE Team.

More specifically,

- (1) Appendix X1 defines dehumidifiers as either “whole-home” or “portable” and use conditions different than those communicated to stakeholders during CASE Team stakeholder engagement sessions.
- (2) Appendix X1 testing under the ‘whole-home’ dehumidifier test method requires the use of a 10” duct and 0.2” of static pressure neither of which represent realistic or compatible testing methods for CEH stand-alone dehumidifiers.
- (3) Appendix X1 testing under the ‘portable’ dehumidifier test method is incompatible with the stated CASE team goals of not using AHAM 2017.
- (4) Appendix X1 on the whole deviates away from the CASE Team’s goal of aligning more closely with other locales.

We propose that the commission adopts either of the following remedies:

- (i) The commission **revises the wording** to incorporate Appendix **X** to Subpart B of 10 CFR Part 430 instead of Appendix **X1**;

or

(ii) The commission includes additional language into the Energy Code to **clarify the testing conditions from Appendix X1**. These terms should at a minimum:

- (A) Specify testing conditions of 73° DB / 60% RH and 0" static pressure for all dehumidifiers.
- (B) Exclude any 10" Ducting required in Appendix X1; and
- (C) Clarify that all other conditions applicable to whole-home dehumidifiers are applicable even if the dehumidifier would otherwise meet the definition of "portable" under Appendix X1.

IDENTIFIED ISSUES

The 2022 terms define "stand-alone dehumidifiers" in a manner consistent with ANSI/AHAM DH-1 2008 but inconsistent with Appendix X1 which splits units into either "whole-home" or "portable" dehumidifiers and features two different test methods (See Section 4.1.1). Because the definitions do not match and the CASE report does not discuss which definition from Appendix X1 is more applicable for CEH dehumidifiers, the application of Appendix X1 is difficult and confusing.

The Federal DOE's original interpretation of the difference between "whole-home" and "portable" units rests on whether they are designed to be compatible with ducting and/or supply processed air to more than one location in a dehumidified space.

Because of the lack of a clear definition and no definitive clues from the CEH CASE report, the Terms as written leave manufacturers, building code inspectors, test labs, and others guessing as to which definition is more applicable and how testing should be conducted.

We highlight the incompatibility of Appendix X1:

(1) Appendix X1 Test Conditions are incompatible with communicated conditions during stakeholder engagement sessions.

The test conditions in Appendix X1 are dissimilar to those presently used in the industry. Appendix X1 section 4.1.1 specifies the following:

- (A) 73° DB / 60% RH – whole-home dehumidifiers; or
- (B) 65° DB / 60% RH – portable dehumidifiers conditions (consistent with AHAM 2017)

As opposed to:

- (C) 80° DB / 60% RH – All dehumidifiers AHAM 2008 and Appendix X.

We note that on April 16, 2020, the CASE team stated its goal of setting a target IEF of 1.9 L/kWh at 80° F / 60% RH conditions in response to a question from another manufacturer. While the Final CASE Report explains why the commission chose to move away from the initial the 1.9 L/kWh target and create two different targets based on unit size, we find no explanation in the final report for the change in environmental test conditions or any related stakeholder input.

(2) The Whole-Home Units test method is incompatible with ductless units

For whole-home dehumidifiers, Appendix X1 requires 10” ducting and measurements at 0.2” of static pressure. This method seems wholly inappropriate for CEH dehumidifiers since many do not operate with any ducts or static pressure. Further, the 10” ducting alone would likely bring many units above the required 0.2” of static pressure; this is before any transitions or additional modifications manufacturers would need to make to install a 10” duct on very large units are considered.

(3) The Portable Units test method is incompatible with stated goals of the Final CEH Report.

Section 2.2.4.4 of the Final CASE Report indicates that the CASE team wanted to align closely with ANSI/AHAM DH-1-2008 instead of AHAM DH-1 2017 because the 2017 edition “was designed only for portable dehumidifiers with low daily capacity”. Yet, for portable units, Appendix X1 describes a test procedure similar to that found in AHAM 2017. (See Attachment A which compares the two methods). We therefore infer that using the portable test conditions of Appendix X1 would not be appropriate.

(4) Using Appendix X1 deviates away from other locales.

The CASE Team’s report refers to existing City of Denver regulations which the Team originally sought to emulate and align with. The CASE Report notes that the city of Denver uses Appendix X of the CFR, yet Section 120.6(h) of the proposed code refers to Appendix X1.¹ While we agree that divergence from the City of Denver was necessary for the different sizes of dehumidifiers, the adoption of a new testing method is unexplained throughout the Final Case Report.

SUGGESTED REMEDIES

We suggest that:

(i) The commission revises the wording to incorporate Appendix X instead of Appendix X1.

Using Appendix X to Subpart B of 10 CFR 430 which incorporates AHAM 2008 by reference would unambiguously clarify the test conditions because Appendix X does not split units into whole-home or portable units. This also aligns the Terms with the current method of calculating IEF used in the industry and the conditions communicated to stakeholders during engagements.

Alternatively, we propose that:

(ii) The commission clarifies the testing conditions under a whole-home dehumidifier standard.

We are not opposed to adopting the environmental conditions defined in Appendix X1 for whole-home dehumidifiers. However, we do ask that language around the exclusion of ducting and static pressure be included into the Energy Code to avoid confusion from testing agencies as these requirements are not applicable to unducted standalone dehumidifiers.

¹ See p. 145 of the CASE Report and 2019 Denver Building and Fire Code, § C403.13.



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In closing, we would like to thank the commission for accepting our comments. We hope that the commission can modify the proposed text to establish clear standards for the growing CEH industry.

Respectfully submitted,

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ATTACHMENT A – COMPARISON BETWEEN AHAM 2017 and APPENDIX X1

AHAM DH-1 2017			APPENDIX X1	
Section	Title	Description	Section	Description
1, 2	Purpose, Scope	...for measuring the capacity and energy input of portable dehumidifiers...	N/A	-
3.1	Definition - Dehumidifier	Dehumidifier means a product, other than a portable air conditioner, room air conditioner, or packaged terminal air conditioner, that is ...	10 CFR Parts 429 and 430, Vol. 81, No. 113	...does not apply to portable air conditioners, room air conditioners, or packaged terminal air conditioners....
3.2	Definition - Portable Dehumidifier	Portable dehumidifier means a dehumidifier designed to operate within the dehumidified space without the attachment of additional ducting, although means may be provided for optional duct attachment.	10 CFR Parts 429 and 430, Vol. 81, No. 113	...Portable dehumidifiers are designed to operate within the dehumidified space without ducting attached, although ducting may be attached optionally...
3.4	Definition - Process Air	Process air means the air supplied to the dehumidifier from the dehumidified space and discharged to the dehumidified space after some of the moisture has been removed by means of the refrigeration system.	10 CFR Parts 429 and 430, Vol. 80, No. 147	...the air supplied to the dehumidifier from the dehumidified space and discharged to the dehumidified space after moisture has been removed....
3.5	Definition - Active Mode	...a dehumidifier is connected to a mains power source, has been activated, and is performing the main functions of removing moisture from air by drawing moist air over a refrigerated coil using a fan, or circulating air through activation of the fan without activation of refrigerant system...	10 CFR Parts 429 and 430, Vol. 80, No. 147	...the dehumidifier has activated its main moisture removal function according to the humidistat or humidity sensor signal, and has activated either the refrigeration system or the fan or blower...
3.6	Definition - Standby Mode	...means any modes where the dehumidifier is connected to a mains power source and offers one or more of the following user-oriented or protective function which may persist for an indefinite time:...	10 CFR Parts 429 and 430, Vol. 80, No. 147	...means any modes where the dehumidifier is connected to a mains power source and offers one or more of the following user-oriented or protective functions which may persist for an indefinite time...
3.7	Definition - Inactive Mode	...means a standby mode that facilitates the activation of active mode by remote switch (including remote control), internal sensor, or time, or that provides continuous status display.	10 CFR Parts 429 and 430, Vol. 80, No. 147	...means a standby mode that facilitates the activation of active mode by remote switch (including remote control), internal sensor other than humidistat or humidity sensor, or timer, or that provides continuous status display.
3.8	Definition - off Mode	...means a mode in which the dehumidifier is connected to a mains power source and is not providing any active or standby mode function, and where the mode may persist for an indefinite time. An indicator that only shows the user that the dehumidifier is in the off position is included within the classification of an off mode.	10 CFR Parts 429 and 430, Vol. 80, No. 147	...means a mode in which the dehumidifier is connected to a mains power source and is not providing any active mode or standby mode function, and where the mode may persist for an indefinite time. An indicator that only shows the user that the dehumidifier is the off position is included within the classification of an off mode.
3.9	Definition - Off-cycle Mode	...means a standby mode in which the dehumidifier: (1) Has cycled off its main function by humidistat or humidity sensor; (2) Does not have its fan or blower operating; and (3) Will reactivate the main function according to the humidistat or humidity sensor signal. ...The off-cycle mode test period shall be 2 hours in duration, during which the power consumption is recorded...Measure and record the average off-cycle mode power of the dehumidifier, POC, in watts.	10 CFR Parts 429 and 430, Vol. 80, No. 147	...means a mode in which the dehumidifier: (1) Has cycled off its main moisture removal function by humidistat or humidity sensor; (2) May or may not operate its fan or blower; and (3) Will reactivate the main moisture removal function according to the humidistat or humidity sensor signal. ...The off-cycle mode test period shall be 2 hours in duration, during which the power consumption is recorded...Measure and record the average off-cycle mode power of the dehumidifier, POC, in watts.
3.10	Definition - Combined Low-Power Mode	...means the aggregate of available modes other than active mode.	10 CFR Parts 429 and 430, Vol. 80, No. 147	...means the aggregate of available modes other than dehumidification mode.

		A relative humidity sensor with an accuracy within 1 percent relative humidity may be used...the average relative humidity over the test period must be within 2 percent of the relative humidity set point, and all individual relative humidity readings must be within 5 percent of the relative humidity set point...		10 CFR Parts 429 and 430, Vol. 80, No. 147	A relative humidity sensor with an accuracy within 1 percent relative humidity may be used...the average relative humidity over the test period must be within 2 percent of the relative humidity setpoint, and all individual relative humidity readings must be within 5 percent of the relative humidity setpoint...
4.3	Instrumentation - RH				
4.3.2	Inactive Mode Measurement	...power measurements shall be measured with uncertainty less than or equal to 0.01 Watts at the 95% confidence level as stated in IEC 62301.		-	-
5.2	Test Room	...For inactive, off, and off-cycle modes the air speed close to the dehumidifier shall be less than 0.5 m/s.		-	-
5.5	Control Setting	...set the controls to the lowest available relative humidity level, and if the dehumidifier has a user-adjustable fan speed, select the maximum fan speed setting...		10 CFR Parts 429 and 430, Vol. 80, No. 147	...the fan would be set at the maximum speed if the fan speed is user adjustable, and the relative humidity controls would be set to the lowest available value during dehumidification mode testing...
6	Nameplate Data	(A) ...Electrical data as required by Underwriters Laboratories (UL) ANSI/UL 474, Dehumidifiers or ANSI/UL 60335-2-40... (B) The rated capacity in pints per 24 hours.		-	-
7	Test Tolerances	DB temperature: Individual reading $\pm 1^\circ\text{F}$ WB temperature: Individual reading $\pm 0.5^\circ\text{F}$ Volts: Individual reading $\pm 1.0\%$		10 CFR Parts 429 and 430, Vol. 80, No. 147	DB temperature: Individual reading $\pm 2^\circ\text{F}$ WB temperature: Individual reading $\pm 1^\circ\text{F}$ Volts: Individual reading $\pm 1.0\%$
8.2	Standard Test Conditions	DB 65°F, WB 56.6°F		10 CFR Parts 429 and 430, Vol. 80, No. 147	Portable: DB 65°F, WB 56.6°F (RH 60%) Whold home: DB 73°F, WB 63.6°F (RH 60%), 0.2" wc. Ex. st.
8.6	Test Procedure	...operate the dehumidifier continuously for a period of 6 hours...		10 CFR Parts 429 and 430, Vol. 80, No. 147	...6-hour dehumidification mode test...
8.7	Calculation of Test Results	(Formulas to correct conditions to 65°F/60%)		10 CFR Parts 429 and 430, Vol. 80, No. 147	(Formulas to correct conditions to 65°F/60%, 73°F/60%)
9	ENERGY CONSUMPTION	Integrated Energy Factor, IEF (Take off-mode, off-cycle-mode, active mode all into calcaultion)		10 CFR Parts 429 and 430, Vol. 80, No. 147	Integrated Energy Factor, IEF (Take off-mode, off-cycle-mode, active mode all into calcaultion)
10.1	Maximum Operating Conditions	Conditions: DB: 90°F WB: 74.8°F RH: 50 % Recommendation: No damage to the electrical parts, continuous operation without tripping motor overload protective devices		-	-
N/A	-	-		-	-
11	Safety	ANSI/ASHRAE-15, ANSI/UL-474, ANSI/UL-60335-2-40		-	-