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Statewide CASE Team - Comments on 45-Day Express Terms - May 24 2024

Additional submitted attachment is included below.

Statewide CASE Team Comments on 45-Day Express Terms

Docket Number 24-BSTD-01

May 24, 2024

Introduction

The California Statewide Utility Codes and Standards Enhancement Team (Statewide CASE Team) presents recommendations in support of the California Energy Commission's (CEC's) efforts to update the state's Building Energy Efficiency Standards, Title 24 Parts 1 and 6 with new or updated requirements for various technologies. The three California Investor-Owned Utilities (IOUs) — Pacific Gas and Electric Company, San Diego Gas and Electric, and Southern California Edison — and two Publicly Owned Utilities — Los Angeles Department of Water and Power and Sacramento Municipal Utility District— sponsored this effort. The Statewide CASE Team's goal is to submit proposals that result in cost-effective enhancements to improve energy efficiency, energy performance, and greenhouse gas (GHG) emissions reductions in California buildings.

The Statewide CASE Team has submitted three prior comments to CEC to recommend revisions to the 2025 Building Energy Efficiency Standards, Title 24 Parts 1 and 6, Express Terms, 45-day Language (45-Day Express Terms). Previous comments were submitted on May 3, 2024 ([TN #256172](#)), May 8, 2024 ([TN #256225](#)), and May 14, 2024 ([TN #256361](#)).

This document presents additional suggested edits to the 45-Day Express Terms.

For the marked-up language, revisions to the 2022 code language that appear in the 45-Day Express Terms are delineated with additions in black underlining and deletions in black ~~strikeouts~~. Our proposed revisions to the 45-Day Express Terms are delineated with additions in red underlining and deletions in red ~~strikeouts~~.

Response to Comments on Multifamily Domestic Hot Water Requirements

Gary Klein & Associates and Build Smart Group submitted comments to the rulemaking docket on May 7, 2024 ([TN #256224](#)) regarding proposed requirements for heat pump water heaters. Their comments cover multiple code change proposals that the Statewide CASE Team recommended in the [Multifamily Domestic Hot Water CASE Report](#),¹ including proposals for heat pump water heater (HPWH) ventilation, electric readiness, and central heat pump water heating. The bullets below summarize Gary Klein & Associates and Build Smart Group's comments and suggested edits and include the Statewide CASE Team's response to each. Gary Klein & Associates and Build Smart Group's comments ([TN #256224](#)) offer additional detail on their recommendations.

¹ The Multifamily Domestic Hot Water CASE Report is available here: https://title24stakeholders.com/wp-content/uploads/2023/08/2025_T24_CASE-Report-MF-DHW-Final-1.pdf.

1. **Gary Klein & Associates / Smart Group’s recommendation:** Remove “split-refrigerant” and “split-hydronic” water heater definitions because these terms are not used in the code language.

CASE Team response: The Statewide CASE Team agrees with the suggestion to delete definitions of “split-refrigerant” and “split-hydronic” because these terms are not used in the code language. These definitions were added to help differentiate split-refrigerant and split-hydronic systems from integrated HPWHs. Defining these systems separately eliminated any chance of misinterpreting the integrated HPWH definition to include these systems, making it clear that the new language in 110.3(c)7B does not apply to split-refrigerant or split-hydronic HPWHs. This clarification can be made in the Compliance Manual.

2. **Gary Klein & Associates / Smart Group’s recommendation:** Add “air source” to the section heading of Section 110.3(c)7 to make it clear that the requirements in this section do not apply to ground source systems.

CASE Team response: The Statewide CASE Team agrees that adding “air source” to the section heading is a reasonable edit for clarity in the current code cycle. If ground source heat pump requirements are added to this section in a future code update, “air source” would need to be removed to revert to the more generic heading.

3. **Gary Klein & Associates / Smart Group’s recommendation:** Require that backup heat be electric resistance and note that backup heat may be internal to the HPWH (Section 110.3(c)7A).

CASE Team response: The Statewide CASE Team agrees with the suggestion to specify that supplementary heat can be internal to the HPWH (as is typically the case with integrated HPWHs). This change makes it clear that built-in resistance heat is considered supplementary heat.

The Statewide CASE Team does not agree with the suggestion to require supplementary heat to be electric resistance thereby disallowing supplementary gas heating. The supplementary heat requirement of Section 110.3(c)7A applies to all air-source HPWH systems, including central systems serving multifamily buildings. As stakeholders brought up during the 45-Day Express Terms workshops, requiring supplementary electric resistance large enough to serve some of these systems would be very costly to install and to operate, and may result in high electricity bills during the winter. Large supplementary electric resistance could also affect grid stability and require greater amounts of dispatchable generation.

4. **Gary Klein & Associates / Smart Group’s recommendation:** Increase the minimum unvented room volume (Section 110.3(c)7B1). Gary Klein & Associates and Build Smart Group are concerned that the lab testing conducted by Larson Energy Research and described in the research paper titled [Heat Pump Water Heaters in Small Spaces Lab Testing: “The Amazing Shrinking Room”](#),² which informed the room volume requirements recommended in the CASE report, would not apply to an insulated unvented room. Therefore, a HPWH installed in an insulated unvented room would not perform as well as the lab testing indicated for the same size room, due to decreased conduction through the walls.

² Larson, Ben, and Sam Larson. 2022. Heat Pump Water Heaters in Small Spaces Lab Testing Study: The Amazing Shrinking Room. Portland: Northwest Energy Efficiency Alliance. Available here: <https://neea.org/resources/heat-pump-water-heaters-in-small-spaces-lab-testing-the-amazing-shrinking-room>

CASE Team response: The Statewide CASE Team’s analysis found that large sealed insulated spaces that meet the room volume requirements in Section 110.3(c)7B1 are unlikely to exist in single family and multifamily dwelling design. The Statewide CASE Team found that most HPWHs will be installed in small closets with ventilation and/or ducts, or in vented and uninsulated garages. Installers are addressing noise from HPWHs (an issue cited in Gary Klein & Associates and Build Smart Group’s comments) by other means than insulating the entire room (e.g., rubber pad, insulated ducts, etc.).

Larson Energy Research’s tests show current manufacturer requirements are adequate to avoid supplementary electric resistance use. Because of this, it is difficult to justify code minimums that are larger than is specified in the 45-Day Express Terms.

The Statewide CASE Team recommends including a discussion of the effects of room volume on HPWH performance in the Compliance Manuals for designers to reference and revisiting this requirement for the 2028 code cycle. Additional testing of HPWHs installed in enclosures with higher wall insulation levels is needed to develop code that addresses Gary Klein & Associates and Build Smart Group’s comments.

5. **Gary Klein & Associates / Smart Group’s recommendation:** Increase the minimum net free area (NFA) (Section 110.3(c)7B2ii).

CASE Team response: Available data such as previously mentioned research by Larson Energy Research shows that more NFA is better, and the 75 square inch per kBtu per hour recommended by Gary Klein & Associates and Build Smart Group is simpler than the requirement in 45-Day Express Terms (125 square inches plus 25 square inches per kBtu per hour). However, their recommendation results in a requirement larger than that required by manufacturers and larger than could be justified from Larson Energy Research’s test results. The Statewide CASE Team recommends including a discussion of the effects of NFA on HPWH performance in the Compliance Manuals for designers to reference. This topic could be revisited for the 2028 code cycle. More data is needed for larger HPWHs (12 kBtu per hour and greater), and these systems may require a combination of a minimum room volume and minimum NFA.

CBCECC does not model HPWH performance with different levels of ventilation. Adding this ability would allow buildings to receive compliance credit for enhanced ventilation and quality installation in the performance approach. This software improvement should be considered for 2028 cycle updates.

6. **Gary Klein & Associates / Smart Group’s recommendation:** Require that the two permanent openings in Section 110.3(c)7B2ii be of equal area.

CASE Team response: The Statewide CASE Team agrees with this clarifying modification.

7. **Gary Klein & Associates / Smart Group’s recommendation:** For ducted installations where only the inlet or outlet are ducted (not both), require the same NFA for makeup air to the enclosure regardless of whether the inlet or the outlet is ducted (Section 110.3(c)7Biv).

CASE Team response: The 45-Day Express Terms require a minimum NFA equal to the cross-sectional area of the duct with a ducted inlet. With a ducted exhaust, 20 square inches is required. Though principles of air flow would imply that at least NFA equal to the cross-sectional area should be required in either

case, it is difficult to justify more than what is already in the 45-Day Express Terms from the available data.

8. **Gary Klein & Associates / Smart Group's recommendation:** Remove option for minimum volume of enclosed space (Section 160.9). The comment states that the electric ready provisions should focus on ensuring access to warm air, and the basis of the volume requirement is that conduction through walls of a room with sufficient volume results in appropriate warm air for the HPWH.

CASE Team response: The Statewide CASE Team does not agree that the language should be amended. Current data suggests that the ventilation method included in the 45-Day Express Terms language is appropriate to meet the needs of the existing market.

9. **Gary Klein & Associates / Smart Group's recommendation:** Add a distinction for whether HPWH uses indoor air or outdoor air (Section 160.9), which would allow the builder to plan for ducting indoors. This change would also add more options for venting outdoors.

CASE Team response: Since this would increase flexibility and meets a need in the market identified by stakeholders, the Statewide CASE Team agrees with the proposed change. The proposed code language for sections 160.9(e)B and 160.9(e)C is presented at the end of this section.

10. **Gary Klein & Associates / Smart Group's recommendation:** Increase the NFA requirement for louvering (Section 160.9).

CASE Team response: Although the commenter raises a valid concern that future HPWH may have higher capacities than the models today, the proposed code language and analysis is grounded in the data available for technology available today. It would be appropriate to re-evaluate and update the code in future update cycles if new products with greater capacities come to market.

11. **Gary Klein & Associates / Smart Group's recommendation:** Require that the two permanent fixed openings to vent the water heater be of the same area (Section 160.9(e)4.B.ii).

CASE Team response: The Statewide CASE Team agrees with this clarifying modification.

12. **Gary Klein & Associates / Smart Group's recommendation:** Allow the two permanent fixed openings to be a combination of louvered doors and fixed openings (Section 160.9(e)4.B.ii).

CASE Team response: Although the Statewide CASE Team understands how this recommendation could apply, the HPWH ready code aims to provide minimum requirements that present a viable pathway for a future retrofit to HPWH. The code language does not intend to account for all possible installation configurations. Although the change seems simple, there are minor details associated with the suggested change that need clarification and would require additional language to address. We recommend against the commenter's recommendation so to keep the code language concise.

13. **Gary Klein & Associates / Smart Group's recommendation:** Allow a combination of permanent openings and one duct.

CASE Team response: Although the Statewide CASE Team understands how this recommendation could apply. Section 160.9 aims to provide minimum requirements that present a viable pathway for a future retrofit to HPWH. The code language does not intend to account for all possible installation configurations. Although the change seems simple, there are minor details

associated with the suggested change that need clarification and would require additional language to address. We recommend against the commenter's recommendation to keep the code language concise.

14. **Gary Klein & Associates / Smart Group's recommendation:** Remove the requirement that airflow from the termination points needs to be diverted away from each other.

CASE Team response: The Statewide CASE Team agrees with the recommendation.

15. **Gary Klein & Associates / Smart Group's recommendation:** Remove the primary prescriptive option for single pass heat pump water heater in Section 170.2(d)2.Ai.

CASE Team response: The Statewide CASE Team does not agree with this recommendation. The proposed primary prescriptive requirement reflects lessons learned from lab testing, field data and cost effectiveness analysis. The proposed primary requirement is also consistent with the Standard Design implemented in the compliance software, which sets the baseline for performance path. The added alternative pathway that leverages the Northwest Energy Efficiency Alliance (NEEA) Advanced Water Heating Specification (AWHS) provides designers flexibility in selecting equipment and system configuration. Additional flexibility in equipment selection and system configuration is available via the performance compliance pathway.

Marked up language for Section 160.9 is provided below.

SECTION 160.9 –MANDATORY REQUIREMENTS FOR ELECTRIC READY BUILDINGS

...

(e) Individual Heat Pump Water Heater Ready....

4. A ventilation method meeting one of the following:

- A. The designated space for the future heat pump water heater shall have a minimum volume of 700 cubic feet; or
- B. If the HPWH will vent indoors, ~~T~~the designated space for the future heat pump water heater shall vent to a communicating space in the same pressure boundary via permanent openings with a minimum total NFA of 250 square inches, so that the total combined volume connected via permanent openings is 700 cubic feet or larger. The permanent openings shall be:
 - i. Fully louvered doors with fixed louvers; or
 - ii. Two permanent fixed openings of equal area located within 12 inches from the enclosure top and bottom;

Exception 1 to Section 160.9(e)B: Two 8 inch ducts may be installed in place of permanent openings if the ducts are installed to a communicating space in the same pressure boundary so that the total combined volume connected via ducts is 700 cubic feet or larger.

- C. If the HPWH will vent to the building exterior, the designated space for the future heat pump water heater shall vent to the exterior via:
 - i. Fully louvered doors with fixed louvers and a minimum total NFA of 250 square inches; or

- ii. Two permanent fixed openings of equal area with a minimum total NFA of 250 square inches located within 12 inches from the enclosure top and bottom; or
 - iii. Two 8 inch capped ducts. All ducts that cross the pressure boundary shall be insulated to a minimum insulation level of R-6 and the ducts, connections, and building penetrations shall be sealed.
- ~~C. The designated space for the future heat pump water heater shall include two 8 inches capped ducts, venting to the building exterior:~~
- ~~i. All ducts, connections, and building penetrations shall be sealed.~~
 - ~~ii. Exhaust air ducts and all ducts which cross pressure boundaries shall be insulated to a minimum insulation level of R-6.~~
 - ~~iii. Airflow from termination points shall be diverted away from each other.~~

Response to Comments on Residential HVAC Performance Requirements

The Statewide CASE Team provides the following comments and changes in response to comments from stakeholders on the 45-Day Express Terms.

Defrost | Section 150.0(h)6

The Statewide CASE Team recommends that Section 150.0(h)6 be modified to clarify that the requirements apply for any *field-adjustable* defrost delay timers. This was always the intent of the proposed measure, and this change clarifies that the requirements do not apply to any other types of defrost controls. There is no requirement on the default value, just on the value that the contractor must set.

- A. If a heat pump is equipped with a *field-adjustable* defrost delay timer, the delay timer shall be set to greater than or equal to 90 minutes.

Prohibition on Undersizing Heat Pump Heating | Section 150.0(h)5

Sizing heat pumps to meet the heating load is important even in heating-dominated climates. In these climates, a heat pump that would be able to satisfy the heating loads would result in a heat pump that is oversized for cooling. Sizing heat pumps is always a tradeoff between the inefficiencies associated with oversizing the system and those associated with reliance on supplementary heat sources. The inefficiencies associated with oversizing cooling are expected to be somewhat minor, especially when the ducts are correspondingly sized.³ However, undersizing heat pumps in these cases can result in significantly lower seasonal efficiencies and impact electric grid demand (particularly when electric resistant supplementary heaters are used). Therefore, the Statewide CASE Team recommends keeping the code language as-is and require that heat pumps not be undersized for the heating load in any climate.

Conflict with ENERGY STAR® Program Requirements

Concerns were raised that the requirement to design to the heating load conflicts with the ENERGY STAR Single Family New Homes program requirements.⁴ The ENERGY

³ Based on analysis of Domanski, Piotr, Hugh Henderson, and W. Vance Payne. 2014. Sensitivity Analysis of Installation Faults on Heat Pump Performance. NIST Technical Note 1848, Gaithersburg, MD: National Institute of Standards and Technology. <http://dx.doi.org/10.6028/NIST.TN.1848>.

⁴ The ENERGY STAR Residential New Construction Program Requirement are available here: <https://www.energystar.gov/partner-resources/residential-new/national-page>.

STAR is a voluntary rating program, and there is no requirement that Title 24, Part 6 requirements align with the program.

ENERGY STAR is currently aligned with an out-of-date version of the Air Conditioning Contractors of America's (ACCA's) *Manual S® - Residential Equipment Selection*.⁵ For almost all California climates, the outdated manual allows oversizing of cooling by up to 130 percent for single speed, 140 percent for two-speed, and 160 percent for variable speed systems. The new version of Manual S (2023) allows for sizing heat pumps to the heating load, which does not conflict with the proposed language in the 45-Day Express Terms. ENERGY STAR may update their requirements for the new Manual S before the 2025 Title 24, Part 6 requirements take effect January 1, 2026, which would then eliminate any conflict. If ENERGY STAR chooses not to align with the 2003 version of Manual S, then projects in most climate zones will be able to comply with both, though in some cases projects may have to install a variable capacity system to meet ENERGY STAR requirements.

There are some climate zones where projects would not be able to comply with both the proposed 45-Day Express Terms and ENERGY STAR. In those climates, the Title 24 compliant system would have few hours of cooling operation with a slightly reduced efficiency due to oversizing. However, the ENERGY STAR-compliant system would result in many heating hours where inefficient supplementary heating (such as strip heating or a gas furnace) would be used. The Statewide CASE Team affirms that the currently proposed Title 24 requirements are best for California.

[Variable Capacity Systems with Third-Party Thermostats | Section 150.0\(h\)9](#)

Concerns were raised that that the proposed 45-Day Express Terms requires third-party thermostats be used with variable capacity systems. The Statewide CASE Team affirms that this is not the case. The requirements only apply in the case where third-party thermostats are used with variable capacity systems and require that any thermostat that is used must be compatible with the variable speed functionality.

Correct Requirements for Thermostats for Heat Pumps with Supplemental Heating | Exceptions to Section 150.0(i)2

Section 150.0(i)2 is a new section of code that establishes requirements for thermostats that are applied to heat pumps with supplemental heating. The requirement is that thermostats must have A) an outdoor temperature sensor, B) a temperature display, and C) a control to lock out supplemental heating based on outdoor air temperature. Thermostats are exempted if the heat pump has an on-board control that locks out supplementary heat as described in Section 150.0(h)7. Exception 1 should cover items A through C and not B and C. The title to this first exception should reflect this. Additionally, the exception refers to Section 150.0(h)9 however, the section describing supplementary heating control is Section 150.0(h)7 and not 150.0(h)9.

Exception 1 to Section 150.0(i) ~~B and A through C~~: Where supplementary heat is locked out above 35°F by another control device in accordance with Section 150.0(h)~~7~~9.

Exception 2 to Section 150.0(i)2: Room air-conditioner heat pumps.

⁵ A current version of ACCA's Manual S – Residential Equipment Selection is available here: <https://www.acca.org/standards/technical-manuals/manual-s>

Since the first exception applies only to items A through C of Section 150.0(i)2 and the second exception applies to all of Section 150.0(i)2, neither of these exceptions should be numbered.

If all heat pump control requirements are located in Section 150.0(h)7, as mentioned in our next comment, then a third exception for Climate Zones 7 and 15, and heat pumps serving dwellings under 500 square feet should reference back to where these are covered in Section 150.0(h)7.

Clarification of Controls for Heat Pumps with Supplementary Heaters in Section 110.2(b)

The Statewide CASE Team recommends that this section retain the pointer that directs readers to Section 150.0(h)7 for all single family homes and clearly state the remaining requirements in Section 110.2(b) apply to nonresidential and multifamily applications. We recommend that Exception 3 be removed and that all the supplemental heating controls requirements for single family homes be contained in Section 150.0(h)7.

The words “electric resistance” should be deleted from the body of the requirements because “electric resistance” was deleted from the title of the section with the intent that all supplementary heating, including gas furnace supplementary heating, should be controlled as described by the section.

Replace the term “compression heating” with the more commonly used term “heat pump heating” in all sections that the term is used.

Do not hyphenate the word “nonresidential” or “multifamily” to remain consistent with hyphenation in use throughout Title 24, Part 6.

Clarifications to Solar PV Requirements

The Statewide CASE Team makes the following suggested changes to the 45-Day Express Terms to improve the clarity of the code language without changing the intent as is shown in the 2025 California Energy Code Technical Measure Report Photovoltaic and Battery Storage System Update and Expansion.⁶ Suggested revisions are presented in the table below.

⁶ CEC, 2025 California Energy Code Technical Measure Report Photovoltaic and Battery Storage System Update and Expansion, May 6, 2024, TN 256201, are available for download here: <https://efiling.energy.ca.gov/GetDocument.aspx?tn=256201&DocumentContentId=91986>.

Section	Proposed Change to 45-Day Express Terms	Comments
TABLE 140.10-A – PV Capacity Factors (W/ft ² of conditioned floor area)	<u>Office, Financial Institution, Unleased Tenant Space, Medical Office Building/Clinic</u>	CEC Staff report lists medical office building/clinic. The 45-Day Express Terms do not. Why was Medical Office Building/Clinic removed?
Table 140.10-B –BESS Capacity Factors (Wh/ft ² of conditioned floor area)	<u>Office, Financial Institution, Unleased Tenant Space, Medical Office Building/Clinic</u>	CEC Staff report lists medical office building/clinic. The 45-Day Express Terms do not. Why was Medical Office Building/Clinic removed?
TABLE 170.2-U – PV Capacity Factors (W/ft ² of conditioned floor area)	<u>Office, Financial Institution, Unleased Tenant Space, Medical Office Building/Clinic</u>	CEC Staff report lists medical office building/clinic. The 45-Day Express Terms do not. Why was Medical Office Building/Clinic removed?
TABLE 170.2-V – BESS Capacity Factors (Wh/ft ² of conditioned floor area)	<u>Office, Financial Institution, Unleased Tenant Space, Medical Office Building/Clinic</u>	CEC Staff report lists medical office building/clinic. The 45-Day Express Terms do not. Why was Medical Office Building/Clinic removed?
TABLE 140.10-A – PV Capacity Factors (W/ft ² of conditioned floor area)	No proposed markup. Library PV capacity factor is 0.39. Update as appropriate.	The library PV capacity factor appears to be an order of magnitude different compared to the other capacity factors for libraries in other climate zones. No other building type has this type of variation among climate zones.
Table 140.10-B –BESS Capacity Factors (Wh/ft ² of conditioned floor area)	No proposed markup. Library PV capacity factor is 0.37. Update as appropriate.	The library BESS capacity factor appears to be an order of magnitude different compared to the other capacity factors for libraries in other climate zones. No other building type has this type of variation among climate zones.
TABLE 170.2-U – PV Capacity Factors (W/ft ² of conditioned floor area)	No proposed markup. Library PV capacity factor is 0.39. Update as appropriate.	The library PV capacity factor appears to be an order of magnitude different compared to the other capacity factors for libraries in other climate zones. No other building type has this type of variation among climate zones.
TABLE 170.2-V – BESS Capacity Factors (Wh/ft ² of conditioned floor area)	No proposed markup. Library PV capacity factor is 0.37. Update as appropriate.	The library BESS capacity factor appears to be an order of magnitude different compared to the other capacity factors for libraries in other climate zones. No other building type has this type of variation among climate zones.
Table 140.10-B –BESS Capacity Factors (Wh/ft ² of conditioned floor area)	Add a footnote to Table 140.10-B –BESS Capacity Factors (Wh/ft ² of conditioned floor area) <u>"Footnotes to Table 140.10-B NR - No Requirement"</u>	Changed need to make clear that NR used in the table means no requirement

Section	Proposed Change to 45-Day Express Terms	Comments
TABLE 170.2-V – BESS Capacity Factors (Wh/ft ² of conditioned floor area)	Add a footnote to Table 170.2-V –BESS Capacity Factors (Wh/ft ² of conditioned floor area) <u>"Footnotes to Table 170.2-V NR - No Requirement"</u>	Changed need to make clear that NR used in the table means no requirement
EQUATION 140.10-A PHOTOVOLTAIC DIRECT CURRENT SIZE	EQUATION 140.10-A PHOTOVOLTAIC DIRECT CURRENT <u>SIZE CAPACITY</u>	Change "size" to be capacity for consistency to other changes in the proposed 45-Day Express Terms
EQUATION 170.2-D PHOTOVOLTAIC DIRECT CURRENT SIZE	EQUATION 170.2-D PHOTOVOLTAIC DIRECT CURRENT <u>SIZE CAPACITY</u>	Change "size" to be capacity for consistency to other changes in the proposed 45-Day Express Terms
Exception 2 to Section 140.10(a).	Exception 2 to Section 140.10(a). No PV system is required where the required PV system <u>size capacity</u> is less than 4 kWdc.	Change "size" to be capacity for consistency to other changes in the proposed 45-Day Express Terms
Exception 2 to Section 170.2(g).	Exception 2 to Section 170.2(g). No PV system is required where the required PV system <u>size capacity</u> is less than 4 kWdc.	Change "size" to be capacity for consistency to other changes in the proposed 45-Day Express Terms
EQUATION 170.2-E BATTERY ENERGY STORAGE SYSTEM RATED ENERGY CAPACITY	EQUATION 170.2-E BATTERY ENERGY STORAGE SYSTEM <u>MINIMUM</u> RATED <u>USABLE</u> ENERGY CAPACITY	Change equation title to match text within 170.2(h) for clarity
170.2(h)	"useable"	Spelling correction
EQUATION 170.2-F - BATTERY ENERGY STORAGE SYSTEM RATED ENERGY CAPACITY, SARA-ADJUSTED	EQUATION 170.2-F - BATTERY ENERGY STORAGE SYSTEM <u>MINIMUM</u> RATED <u>USABLE</u> ENERGY CAPACITY, SARA-ADJUSTED	Change equation title to match text within 170.2(h) for clarity
EQUATION 170.2-G BATTERY ENERGY STORAGE SYSTEM RATED POWER CAPACITY	EQUATION 170.2-F-G BATTERY <u>ENERGY STORAGE SYSTEM</u> <u>MINIMUM</u> RATED POWER CAPACITY	Change equation title to match text within 170.2(h) for clarity
170.2(h)	... <u>and the rated power capacity shall be not less than the Minimum Rated Power Capacity determined by Equation 170.2-G.</u> ...	Add rated for consistency in terms and clarity of requirement

Section	Proposed Change to 45-Day Express Terms	Comments
EQUATION 170.2-F - BATTERY ENERGY STORAGE SYSTEM RATED ENERGY CAPACITY, SARA-ADJUSTED	<u>Minimum</u> Rated Usable Energy Capacity of the battery storage system <u>BESS</u> in kWh.	Add B so acronym is consistent with other use of term
Exception 1 to Section 170.2(h):	Exception 1 to Section 170.2(h): No battery storage system <u>BESS</u> is required if the installed PV system size <u>capacity</u> is less than 15 percent of the size <u>capacity</u> determined by Equation 170.2-D.	Change "size" to be capacity for consistency to other changes in the proposed 45-Day Express Terms
140.10(b)	Battery <u>Energy</u> storage system (<u>BESS</u>) requirements. All buildings that are required by Section 140.10(a) to have a PV system shall also have a battery storage system <u>BESS</u> meeting the minimum qualification requirements of Reference Joint Appendix JA12. <u>The rated energy capacity shall be not less than the Minimum Rated Useable Energy Capacity determined using Equation 140.10-B, or Equation 140.10-C if SARA was used to determine the PV capacity in Section 140.4(a) 140.10(a).</u> The rated power capacity shall be not less than the Minimum Power Capacity determined using Equation 140.10-D. ...	Correcting reference from 140.4(a) to 140.10(a).

Multizone Heat Pump Baseline Flexibility

The Statewide CASE Team appreciates the ongoing dialog regarding the need to provide flexibility and variety of heat pump-based options in the prescriptive code for multizone HVAC systems. The Statewide CASE Team would like to acknowledge the CEC's intention of adding the option of approval by the Executive Director, via the exceptional method, for additional systems other than the ones described in the prescriptive package. The Statewide CASE Team looks forward to collaborating with CEC to develop a list of additional multizone heat pump system types and work with CEC and its technical contractors to analyze those systems using CEC prototypes and metrics (i.e., long-term systemwide cost and source energy).

Clarification to Mandatory Covered Process Requirements

To help clarify the energy code and to improve code compliance, the Statewide CASE Team recommends adding language to the beginning of Section 120.6 to guide readers to new sections that have been added pertaining to mandatory covered process requirements. This pointer language has been added to Section 100.0 Scope, so this change builds on existing proposed code language changes for the 2025 cycle.

The proposed changes for Section 120.6 are presented below.

SECTION 120.6 – MANDATORY REQUIREMENTS FOR COVERED PROCESSES

Nonresidential and hotel/motel buildings shall comply with the applicable requirements of Sections 120.6(a) through 120.6(g)- and the applicable requirements in Sections 110.2 and 120.3