High-Performance Measure Details

Measure Name
Cold Climate Variable Refrigerant Flow

Use Category
SH – Cold Climate VRF

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February 09, 2026

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N/A

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3

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LM401

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Early Adoption & High Priority Data Collection

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Technology Summary

Cold Climate Variable Refrigerant Flow (ccVRF) and qualifying multi-zone air-to-air heat pump systems are air-source, electrically driven HVAC systems that use a shared refrigerant circuit to serve multiple indoor units from one or more centralized outdoor units. These systems are commonly applied in nonresidential and high-rise multifamily buildings where zone-level control, load diversity, and flexible installation are important design considerations. Within the context of California Energy Design Assistance (CEDA), ccVRF systems represent an electrified alternative to conventional fossil-fuel-based space heating systems, aligning with statewide decarbonization and grid modernization objectives while supporting high-performance new construction.

For California's electrification pathway, cold-climate-capable VRF and multi-zone systems are significant because they maintain stable heating performance at lower outdoor air temperatures than standard heat pump systems. This supports reduced reliance on electric resistance or gas-fired supplemental heating, lowers peak winter demand impacts when properly designed, and improves overall system efficiency through variable-capacity compressor modulation and zone-level load matching. When paired with advanced controls and demand-response

functionality, these systems can also support grid-resilient operation and improved building performance during peak conditions.

In practice, however, performance gaps are common. These include: (1) reliance on supplemental heating due to inadequate low-temperature capacity verification; (2) selection of systems without documented cold-weather performance data; (3) improper indoor-outdoor unit configuration that does not match rated performance; (4) lack of coordinated defrost control, leading to comfort disruptions and efficiency losses; (5) limited operational visibility or trend data to confirm real-world performance; and (6) controls not configured to prioritize stable heating or demand-response readiness. This HPM is structured to address these recurring implementation issues through clear performance and control verification pathways.

Relevant industry rating standards and certifications include AHRI Standard 1230, AHRI Standard 210/240, ENERGY STAR® Cold Climate Heat Pump specifications, and applicable provisions of California Title 24, Part 6.

Alignment with CEDA Program Goals

The CEDA program supports the implementation of energy efficiency measures that advance Code Readiness's Long Term Tactical Plan (LTTP) to drive the goals of electrification, decarbonization, and load reduction.

Projects must meet one of the CEDA Inducement Requirements identified in the next section to receive an inducement and will be evaluated for the level of interest in metering to support Code Readiness Objectives.

This measure meets the CEDA program goals as follows:

- **Building partnerships with market stakeholders** by consulting on innovative technologies and best practices in energy efficiency, which can lead to the development of more effective solutions and accelerate the adoption of new technologies. As teams adopt the measure, this increases the volume of engineers able to design the equipment, contractors capable of installing the equipment, and owners able to operate the equipment.
- **Increasing the supply of high-performance measures and all-electric buildings** by combining electrification with energy efficiency that can result in projects implementing measures to achieve greater energy savings, reduced emissions, and overall improved building performance. As more buildings install ccVRF and ccMZHP systems, it helps expand market availability, strengthens installer familiarity, and supports broader adoption across both new construction and existing buildings.
- **Increasing the demand for high-performance measures and all-electric buildings** by pushing for electrification that drives the need for technological advancements, supporting economic growth opportunities through innovation, and raising awareness of the benefits of electrification to increase consumer adoption. As demand in the market increases for newer technologies, the long-term benefit is increased demand for manufacturers and suppliers to provide additional options available in the market.
- **Advancing new high-performance measure technology** by raising public awareness about new technologies and their benefits, helping build acceptance and demand through market support advocacy efforts that can influence stakeholder decisions that enable technological innovation.
- **Providing Codes & Standards with projects of interest** to collect metered data that will inform future California energy codes.

CEDA Inducement Requirements

The following inducement requirements are designed to accelerate market adoption of cold climate VRF and multi-zone heat pump systems by enhancing energy efficiency, lowering operational costs, and reducing carbon emissions while reducing reliance on auxiliary heating. Project inducements will be determined by assessing each project's projected energy-savings impacts and its ability to support broader electrification adoption.

This HPM offers two independent design levels: **Essential — Cold Climate Variable Refrigerant Flow (ccVRF) & Multi-Zone Heat Pump (ccMZHP) Systems** and **Premium — Cold Climate VRF & MZHP Systems with Advanced Controls**. Project teams must comply with one design level—Essential or Premium—to be eligible. The tiers are independent; projects are not required to meet both. Refer to the tier-specific sections that follow for the applicable System Design Requirements and Supporting Documentation Requirements for the option you are claiming.

System Scope Clarification

This measure does not apply to collections of independent single-zone heat pump systems, paired or grouped mini-split systems without centralized system control, or other equipment types addressed under the Cold Climate Air-to-Air Heat Pump (ccASHP) HPM, where applicable.

For the purposes of this HPM, "Cold Climate VRF and Multi-Zone Heat Pump Systems" refers to air-source, refrigerant-based HVAC systems that:

- Serve multiple indoor units from one or more centralized outdoor units through a shared refrigerant circuit;
- Provide independent zone-level control under a manufacturer-provided system-level controller that coordinates compressor operation, refrigerant flow, zone demand aggregation, and defrost sequencing; and
- Are certified using an applicable rating pathway based on system cooling capacity:
    - *≥65,000 Btu/h:* AHRI Standard 1230-2023 certified multi-split/VRF system configuration; or
    - *<65,000 Btu/h (Alternative Pathway):* AHRI Standard 210/240 certified multi-split/VRF system configuration with manufacturer-published low-temperature heating performance data sufficient to verify the Essential tier cold-climate requirements (including verifiable COP @ 17°F).

Note: The <65,000 Btu/h Alternative Pathway applies to the Essential tier only. Premium eligibility requires AHRI 1230-2023 certification (≥65,000 Btu/h).

System Design Requirements

1. **Essential level**: Cold Climate Variable Refrigerant Flow & Multi-Zone Heat Pump Systems
    1.1. Eligible Equipment
        1.1.1. For eligibility, this measure applies exclusively to air-source, refrigerant-based multi-zone systems (VRF and qualifying multi-zone heat pump systems) designed to provide space heating and cooling in cold outdoor conditions.[a]
        1.1.2. Eligible systems shall consist of one or more outdoor units connected via refrigerant piping to multiple indoor units, providing independent zone-level temperature control through a single, integrated refrigerant system with system-level coordination of capacity and defrost operation.

[a] This measure applies only to VRF and multi-zone systems operating as electric air-to-air heat pumps. Hydronic, water-source, or ground-source VRF configurations are not included.

1.2. Performance Requirements

1.2.1. This tier applies to non-ducted, ducted, and mixed ducted/non-ducted indoor unit configurations.

1.2.2. Certification pathway (by system cooling capacity):

1.2.2.1. *AHRI 1230 Pathway (≥65,000 Btu/h):* The ccVRF or ccMZHP system shall be AHRI-certified to AHRI Standard 1230-2023, verifiable in the AHRI Directory, and reflecting the installed system configuration (including matched system combinations and indoor unit configuration, where applicable).

1.2.2.2. *Alternative Pathway (<65,000 Btu/h):* The ccVRF or ccMZHP system shall be AHRI-certified to AHRI 210/240 (multi-split/VRF configuration), verifiable in the AHRI Directory, and reflecting the installed system configuration. The project shall also provide manufacturer low-temperature heating performance data sufficient to verify COP @ 17°F for the installed outdoor unit and compatible indoor unit series/configuration.

1.2.3. Minimum efficiency requirements:

1.2.3.1. *For ≥65,000 Btu/h systems (AHRI 1230):* meet or exceed the minimum efficiencies shown in the table below (IEER and COP @ 47°F and COP @ 17°F), with COP @ 5°F reported if available.

1.2.3.1.1. Table for ≥65,000 Btu/h systems (AHRI 1230-2023):

System Cooling Capacity Size Category	Required Minimum Efficiency[b] *(AHRI 1230-2023)*	Low-Temp COP @ 5°F *(Report if Available)*
≥65,000 Btu/h and <135,000 Btu/h	18.9 IEER 3.40 COP at 47°F 2.25 COP at 17°F	COP @ 5°F *(if available)*
≥135,000 Btu/h and < 240,000 Btu/h	18.0 IEER 3.25 COP at 47°F 2.07 COP at 17°F	COP @ 5°F *(if available)*
≥240,000 Btu/h	17.0 IEER 3.20 COP at 47°F 2.05 COP at 17°F	COP @ 5°F *(if available)*

Note: COP @ 17°F is required for eligibility and must be verifiable in AHRI-certified performance data. COP @ 5°F values may not be available for all AHRI 1230 listings and are not required for Essential-tier eligibility; when available, they shall be reported for informational purposes.

1.2.3.2. For <65,000 Btu/h systems (Alternative Pathway):

1.2.3.2.1. Must meet or exceed minimum AHRI-rated SEER2/HSPF2 requirements applicable to the AHRI 210/240-rated configuration, as shown on the AHRI certificate/directory listing and/or manufacturer rating documentation; and

1.2.3.2.2. Must provide verifiable COP @ 17°F ≥ 2.0 (heat pump operation only) from manufacturer extended performance data (or equivalent published engineering tables) tied to the installed outdoor unit and compatible indoor unit series/configuration.

1.2.3.2.3. COP @ 5°F is encouraged and shall be provided when available but is not required for Essential-tier eligibility for <65,000 Btu/h systems.

1.3. System Controls

1.3.1. The system shall include a manufacturer-provided, system-native controller required for normal operation. The controller shall coordinate refrigerant flow, compressor operation, zone demand aggregation, and defrost operation across all indoor and outdoor units.

[b] Requirements are consistent with minimums specified by NEEP.

1.3.1.1. For AHRI 1230 systems (≥65,000 Btu/h), the controller shall be certified as part of the AHRI 1230-listed configuration.

1.3.1.2. For Alternative Pathway systems (<65,000 Btu/h), the controller shall be manufacturer-provided for the multi-split/VRF system and documented as required for normal multi-zone operation and coordinated defrost sequencing.

1.4. Defrost Control

1.4.1. The system shall utilize automatic, system-coordinated defrost strategies managed by the system-native controller, returning the system to stable heating operation following defrost events without manual intervention.

2. **Premium level**: Cold Climate VRF & MZHP Systems with Advanced Controls

2.1. Eligible Equipment

2.1.1. Premium eligibility applies to air-source ccVRF or ccMZHP systems intended for primary space heating, where the system is designed and configured to carry the full design heating load at the outdoor design temperature under normal operation, with backup heating limited to emergency/safety or manufacturer-initiated defrost/recovery operation.

2.1.2. Eligible systems shall consist of one or more outdoor units connected via refrigerant piping to multiple indoor units, providing independent zone-level temperature control as a single, integrated refrigerant system under a manufacturer-provided system-level controller.[c]

2.2. Performance Requirements

2.2.1. This tier applies to non-ducted, ducted, and mixed ducted/non-ducted indoor unit configurations.

2.2.2. The ccVRF or ccMZHP system shall be AHRI-certified to AHRI Standard 1230-2023, verifiable in the AHRI Directory and reflecting the installed system configuration.

2.2.3. The system shall meet or exceed the following minimum efficiencies (AHRI 1230-2023):

2.2.3.1. Minimum efficiency requirements:

System Cooling Capacity Size Category	Required Minimum Efficiency[d] *(AHRI 1230-2023)*
≥65,000 Btu/h and <135,000 Btu/h	18.9 IEER 3.40 COP at 47°F 2.25 COP at 17°F
≥135,000 Btu/h and < 240,000 Btu/h	18.0 IEER 3.25 COP at 47°F 2.07 COP at 17°F
≥240,000 Btu/h	17.0 IEER 3.20 COP at 47°F 2.05 COP at 17°F

2.2.4. Verifiable COP @ 5°F (Premium Add):

2.2.4.1. Where COP @ 5°F is available for the AHRI-listed system configuration, the system shall meet or exceed the following minimum COP @ 5°F values:

2.2.4.1.1. ≥65,000 and <135,000 Btu/h: COP @ 5°F ≥ 1.55

2.2.4.1.2. ≥135,000 and <240,000 Btu/h: COP @ 5°F ≥ 1.50

2.2.4.1.3. ≥240,000 Btu/h: COP @ 5°F ≥ 1.45

[c] This measure applies only to VRF or multi-zone systems operating as electric air-to-air heat pumps. Hydronic, water-source, or ground-source VRF configurations are not included.

[d] Requirements are consistent with minimums specified by NEEP.

2.2.4.2. Note: COP @ 5°F is enforceable only when it is provided as verifiable performance data for the AHRI-listed configuration. *Verifiable COP @ 5°F* means COP @ 5°F is shown for the AHRI-listed system configuration (AHRI directory/certificate) or is provided in manufacturer extended performance data that explicitly references the same AHRI-listed outdoor unit and compatible indoor-unit series/configuration.

2.2.4.3. Example: If the AHRI listing includes COP @ 5°F for the submitted configuration, the project must meet the COP@5°F threshold; if COP @ 5°F is not listed/provided, the project may still qualify based on IEER and COP@17°F.

2.3. Primary Heat Design Intent

2.3.1. Premium-tier systems shall be designed to meet 100% of the calculated design heating load at the outdoor design temperature without reliance on electric resistance or gas backup heating during normal operation. If supplemental heat is installed, it shall be limited to emergency/safety functions only.

2.4. Advanced Controls, Observability, and Stable Defrost/Recovery

2.4.1. The system shall include a manufacturer-provided system-level controller capable of coordinating indoor and outdoor units as a single integrated refrigerant system, including coordinated defrost sequencing, controlled post-defrost recovery, and prevention of unstable operating states (e.g., rapid mode switching or conflicting zone demands).

2.4.2. The controller shall provide operational observability sufficient to verify cold-weather behavior, including visibility of compressor operation/loading, operating mode (heating/cooling/defrost/recovery), and system faults/alarms. Data shall be available at intervals of one minute or less (trend logs, exports, or equivalent).

2.4.3. System-level electrical power/energy monitoring or manufacturer-supported estimation is acceptable, provided it supports load profiling and performance evaluation.

2.5. Demand-Response Readiness

2.5.1. The system shall be DR-ready consistent with Title 24, Part 6, Section 110.12(a), including the ability to receive an external DR signal and implement controlled heating/cooling setpoint adjustments with stable recovery.

Supporting Documentation Requirements

Projects must submit documentation sufficient to verify that the installed ccVRF or ccMZHP system meets the selected design tier. Documentation is intended to confirm (1) the installed system qualifies as an AHRI 1230-certified integrated multi-zone refrigerant system or meets the <65,000 Btu/h Alternative Pathway, (2) required cold-climate performance is verifiable (including COP @ 17°F, and COP @ 5°F where applicable), and (3) tier-specific controls and design intent are present. Documentation should be limited to commonly available submittals, AHRI listings, and screenshots/exports from manufacturer control platforms.

1. Essential Level — Supporting Documentation

1.1. Equipment Eligibility and Certification

1.1.1. Equipment schedule/submittals identifying manufacturer, model number(s), outdoor unit(s), indoor unit types/count, and system configuration (ducted/non-ducted/mixed).

1.1.2. Certification documentation (as applicable by capacity pathway):

1.1.2.1. *For systems ≥65,000 Btu/h:* AHRI certificate (or AHRI Directory printout) demonstrating the system is AHRI 1230-2023 certified and reflects the installed system configuration (including matched system combinations and indoor unit configuration, where applicable).

1.1.2.2. *For systems <65,000 Btu/h (Alternative Pathway):* AHRI certificate (or AHRI Directory printout) demonstrating the system is certified under AHRI 210/240 in a multi-split/VRF configuration, reflecting the installed outdoor unit and compatible indoor unit series/configuration.

1.2. Performance Compliance

1.2.1. AHRI-certified performance data (certificate/directory listing) demonstrating compliance with the required IEER and COP @ 47°F and COP @ 17°F thresholds for the applicable capacity category.

1.2.2. Systems ≥65,000 Btu/h (AHRI 1230 Pathway):

1.2.2.1. AHRI-certified performance data (certificate/directory listing) demonstrating compliance with the required IEER and COP @ 47°F and COP @ 17°F thresholds for the applicable capacity category.

1.2.2.2. (If available) COP @ 5°F performance data (AHRI listing or manufacturer extended performance data) may be provided for informational purposes when available.

1.2.3. Systems <65,000 Btu/h (Alternative Pathway):

1.2.3.1. Manufacturer extended performance data (or equivalent published engineering tables) tied to the installed outdoor unit and compatible indoor unit series/configuration demonstrating COP @ 17°F ≥ 2.0 (heat pump operation only).

1.2.3.2. (If available) COP @ 5°F performance data may be provided for informational purposes when available.

1.3. Controls and Defrost Evidence

1.3.1. Manufacturer documentation or submittals identifying the system-native controller required for normal operation (e.g., controller cut sheet, controls submittal, sequence excerpt), demonstrating system-level coordination.

1.3.2. Confirmation the system utilizes automatic, system-coordinated defrost (manufacturer controls documentation, sequence excerpt, or control narrative).

1.4. Installation Evidence

1.4.1. Photo documentation of installed outdoor unit(s) and representative indoor unit(s), with nameplates visible where practical, sufficient to confirm installed scope.

2. Premium Level — Supporting Documentation

2.1. Equipment Eligibility and Certification

2.1.1. Equipment schedule / submittals identifying manufacturer, model number(s), outdoor unit(s), indoor unit types/count, and system configuration.

2.1.2. AHRI certificate (or AHRI Directory printout) demonstrating the system is AHRI 1230-2023 certified and reflects the installed system configuration.

2.2. Performance Compliance (Including Verifiable COP @ 5°F Rule)

2.2.1. AHRI-certified performance data demonstrating compliance with required IEER and COP @ 17°F for the applicable capacity category.

2.2.2. *(When applicable)* If COP @ 5°F is provided for the AHRI-listed configuration (AHRI directory/certificate) or via manufacturer extended performance data explicitly tied to the AHRI-listed outdoor unit and compatible indoor unit series/configuration, provide documentation showing compliance with the Premium COP @ 5°F threshold.

2.3. Primary Heat Design Intent and Backup Heat Limits

2.3.1. Brief design narrative or calculation excerpt confirming the system is designed to meet 100% of the calculated design heating load at the outdoor design temperature under normal operation.

2.3.2. If supplemental heat is installed, provide documentation indicating it is limited to emergency/safety only (e.g., sequence excerpt, control narrative, equipment schedule notes, or supplemental heat schedule).

2.4. Advanced Controls, Observability, and Stable Defrost/Recovery

2.4.1. Controls submittal or manufacturer documentation identifying the system-level controller and its role coordinating multi-zone operation, defrost sequencing, and post-defrost recovery.

2.4.2. Screenshot(s), export(s), or representative trend log evidence demonstrating operational observability (one-minute intervals or less) showing visibility of:

2.4.2.1. Operating mode (heating/cooling/defrost/recovery)

2.4.2.2. Compressor loading/operation (or equivalent system status indicators)

2.4.2.3. Faults/alarms (where applicable)

2.4.3. *(If available)* Screenshot(s) or documentation showing system-level electrical power/energy monitoring or manufacturer-supported estimation.

2.5. Demand-Response Readiness (Title 24 §110.12(a))

2.5.1. Evidence the system is DR-ready, such as one or more of the following:

2.5.1.1. Controls submittal/sequence indicating DR capability (controlled setpoint adjustment + recovery)

2.5.1.2. Screenshot/configuration page showing DR enablement or supported interface

2.5.1.3. Documentation identifying the DR communication pathway (utility program/aggregator/OpenADR-capable gateway/approved interface), where applicable

2.6. Installation Evidence

2.6.1. Photo documentation of installed outdoor unit(s), representative indoor unit(s), and the system controller/interface sufficient to confirm installed scope.

3. System Cost Documentation

3.1. Provide at least one project document that includes pricing for the ccVRF/ccMZHP system (e.g., contractor proposal, vendor quote, or estimate). Pricing should be sufficient to identify the major system components (outdoor units, indoor units, branch components, and system controller). Itemized invoices are not required if not available for the project phase.

3.2. Premium claims should also include any added pricing for advanced controls/monitoring features used to meet Premium requirements.

Incremental Measure Cost

The Incremental Measure Cost (IMC) represents the incremental cost of installing a cold climate variable refrigerant flow (ccVRF) or cold climate multi-zone heat pump (ccMZHP) system relative to a non–cold climate VRF or MZHP system of equivalent nominal cooling capacity and comparable indoor-unit scope.

Consistent with CEDA's market-support objectives, IMC values are presented using capacity-normalized units ($/ton) and representative market pricing suitable for new construction and major alterations, where itemized equipment invoices are not typically available. Cost estimates reflect typical incremental material, installation, and commissioning efforts required to meet the selected design tier requirements and are reviewed and updated periodically based on market data.

Base Case

The base case assumes installation of a code-compliant, non–cold climate VRF or multi-zone heat pump system of equivalent nominal capacity and comparable indoor unit count/configuration.

Base case characteristics include:

- Standard VRF/MZHP system (may include a basic low-ambient kit), not intended to meet cold-climate performance thresholds at 47°F and 17°F under AHRI 1230.
- System design that may rely on supplemental heating (electric resistance or gas) at lower outdoor temperatures as needed for space-heating capacity and comfort.

Measure Case

The measure case is a ccVRF or ccMZHP system certified under AHRI 1230-2023 that meets the HPM's tier-specific cold-climate performance and controls requirements.

Essential Tier measure case (minimum):

- AHRI 1230-2023 certified configuration meeting the required IEER and verifiable COP @ 17°F thresholds (COP @ 5°F reported when available).
- Manufacturer-provided system-native controller coordinating system operation and defrost at the system level.

Premium Tier measure case (incremental to Essential):

- Designed and configured for primary space heating, meeting 100% of the calculated design heating load at the outdoor design temperature under normal operation, with supplemental heat limited to emergency/safety only.
- Advanced controls and observability beyond baseline operation (system coordination, stable defrost/recovery, and operational trend visibility), plus DR-ready capability consistent with Title 24 §110.12(a).
- COP @ 5°F thresholds apply only when verifiable performance data for COP @ 5°F is available for the submitted AHRI-listed configuration (or equivalent manufacturer extended performance data tied to the AHRI-listed configuration).

Cold-Climate Performance Reference Table:

Cooling Capacity Size Category	Minimum Efficiency[e] *(AHRI 1230-2023)*
≥65,000 Btu/h and <135,000 Btu/h	8.9 IEER; COP 3.40 @ 47°F; COP 2.25 @ 17°F *(COP @ 5°F reported if available; Premium threshold applies if verifiable)*
≥135,000 Btu/h and < 240,000 Btu/h	18.0 IEER; COP 3.25 @ 47°F; COP 2.07 @ 17°F *(COP @ 5°F reported if available; Premium threshold applies if verifiable)*
≥240,000 Btu/h	17.0 IEER; COP 3.20 @ 47°F; COP 2.05 @ 17°F *(COP @ 5°F reported if available; Premium threshold applies if verifiable)*

IMC Values and Normalization

Normalized Cost Basis: $/ton (nominal cooling capacity)

Essential Level – Incremental Measure Cost

System Cooling Capacity	Incremental Cost
65,000 – <135,000 Btu/h	$750 per ton
135,000 – <240,000 Btu/h	$625 per ton
≥240,000 Btu/h	$500 per ton

Note: For systems <65,000 Btu/h under Essential Level, apply the 65,000–<135,000 Btu/h IMC value on a $/ton basis for screening and inducement calibration purposes unless future market data supports a separate <65k cost bin.

Premium Level – Incremental Measure Cost

System Cooling Capacity	Incremental Cost
65,000 – <135,000 Btu/h	$950 per ton
135,000 – <240,000 Btu/h	$800 per ton
≥240,000 Btu/h	$650 per ton

The Premium design level builds upon the Essential configuration by requiring a primary-heating design intent (100% design heating load at outdoor design temperature), enhanced system controls/observability, stable cold-weather operation, and DR-ready capability, which typically increases equipment, controls, and commissioning effort relative to standard VRF/MZHP systems.

[e] Requirements are consistent with minimums specified by NEEP.

These values represent typical incremental costs for new construction and major alterations and are intended for program inducement calibration rather than project-specific cost reconciliation.

Sources

IMC values are informed by a combination of publicly available market pricing, industry cost references, and program experience, and are intended to reflect typical market conditions rather than project-specific pricing, including:

- U.S. Department of Energy – What's VRF? (2016)
- Pacific Northwest National Laboratory (PNNL) – Variable Refrigerant Flow Systems (2012)
- ComEd – Cold Climate Variable Refrigerant Flow Pilot (2023)
- NEEP Cold Climate Air Source Heat Pump Product List Update (2023)
- Bonneville Power Administration – Measure Report Summary for VRF (2011)

Code Readiness Objectives

Cold climate VRF and multi-zone heat pump systems are well suited for applications in which heating design outdoor air temperatures are moderate while performing efficiently in climates where winter conditions routinely approach or fall below freezing. Cold climate VRF and MZHP systems can play a meaningful role in managing winter electrification impacts, particularly by reducing peak heating demand and limiting reliance on supplemental electric or fossil-fuel heating.

By maintaining higher heating capacity and efficiency at lower outdoor temperatures, cold climate VRF and multi-zone heat pump systems have the potential to mitigate winter electric peak growth associated with space-heating electrification, thereby reducing upstream impacts on transmission and distribution infrastructure. This measure is intended to advance electrification and greenhouse gas emissions reductions by targeting the following objectives:

- Increase adoption of cold climate VRF and multi-zone heat pump systems in commercial and residential applications suitable for cold climate performance.
- Reduce reliance on electric resistance and gas-fired supplemental heating through system designs that prioritize verified low-temperature heat pump performance and appropriate control strategies.

Code Readiness Site Monitoring

If selected for Code Readiness monitoring, equipment energy consumption and mechanical system performance may be monitored on-site for a period of up to 12 months. To support performance evaluation and data collection, projects shall provide reasonable access for the installation and operation of metering, sensors, and communication equipment.

Projects equipped with a Building Automation System (BAS), Energy Management System (EMS), or equivalent platform should enable integration of advanced metering devices through the existing system to facilitate data collection and remote access. For projects without a BAS or EMS, the Code Readiness team may install temporary stand-alone data loggers, sensors, and communication equipment as needed to monitor system performance for the duration of the monitoring period.

Instrumentation may be installed or supplemented, where necessary, to measure key system and equipment parameters sufficient to evaluate cooling system performance and operational characteristics. All monitoring equipment will be temporary and installed in a manner that minimizes disruption to normal building operations.

Data Benefits

In California, the goal of the data research into VRF and MZHP systems that can operate in cold climates is to understand if there are further benefits to energy efficiency in mild climates with the same capacity equipment and, if the use of supplemental heat can be fully removed or never utilized compared with alternative systems which provide supplemental heating at warmer conditions (32°F to 40°F). At the same time, some attributes of cold climate VRF and MZHP systems are not directly beneficial in CA climates, while other functions, such as the elimination of supplemental heating, may provide additional benefits in mild climates.

Sample Data Points

A sample set of data points that would ideally be collected is provided below for reference. This list will be re-developed for each project based on the infrastructure and need of the monitoring effort:

Data Points to Meter	Unit	Additional Specifications
Compressor power draw	kW	Maximum and minimum values, measured via CT on compressor circuit
Supplemental electric resistance heat power draw	kW	Measure via separate CT on resistance heat circuit to distinguish from compressor load
Outdoor air temperature	°F	Measure via outdoor sensor
Indoor zone temperature	°F	Measure via internal sensor

Code Reference

2025 CA Title 24, Part 6, Section 110.2– Mandatory Requirements for Space-Conditioning Equipment

110.2(b) Controls for heat pumps with supplementary heaters*:*

Control requirements for heat pumps with supplementary heaters in single-family residential buildings are specified in Section 150.0(h)7 and Section 150.0(i)2. Heat pumps with supplementary heaters in nonresidential and multifamily buildings shall have controls:

1. *That prevent supplementary heater operation when the heating load can be met by the heat pump alone; and*
2. *In which the cut-on temperature for heat pump heating is higher than the cut-on temperature for supplementary heating, and the cut-off temperature for heat pump heating is higher than the cut-off temperature for supplementary heating.*

Exception 1 to Section 110.2(b): *The controls may allow supplementary heater operation during:*

A. Defrost; and
B. Transient periods such as start-ups and following room thermostat setpoint advance, if the controls provide preferential rate control, intelligent recovery, staging, ramping or another control mechanism designed to preclude the unnecessary operation of supplementary heating.

Exception 2 to Section 110.2(b): *Room air-conditioner heat pumps.*

110.2(c) Thermostats*:*

All heating or cooling systems not controlled by a central energy management control system (EMCS) shall have a setback thermostat.

1. *Setback capabilities. All thermostats shall have a clock mechanism that allows the building occupant to program the temperature setpoints for at least four periods within 24 hours. Thermostats for heat pumps shall meet the requirements of Section 110.2(b).*

Exception 1 to Section 110.2(c): *Gravity gas wall heaters, gravity floor heaters, gravity room heaters, noncentral electric heaters, fireplaces or decorative gas appliances, wood stoves, room air conditioners and room air conditioner heat pumps.*

Table 110.2-G Electrically Operated Variable Refrigerant Flow Air-to-Air and Applied Heat Pumps – Minimum Efficiency Requirements:

Equipment Type	Size Category	Heating Section Type	Sub-Category or Rating Condition	Minimum Efficiency	Test Procedure
VRF Air Cooled, (cooling mode)	<65,000 Btu/h	All	VRF Multi-split System	13.0 SEER Before 1/1/2023 Federal Minimum=SEER2 On or after 1/1/2023	AHRI 1230 Before 1/1/2023 AHRI 210/240 On or After 1/1/2023
VRF Air Cooled, (cooling mode)	≥65,000 Btu/h and <135,000 Btu/h	Electric Resistance (or none)	VRF Multi-split System[f]	10.3 EER Federal Minimum IEER	AHRI 1230
VRF Air Cooled, (cooling mode)	≥135,000 Btu/h and <240,000 Btu/h	Electric Resistance (or none)	VRF Multi-split System[b]	9.9 EER Federal Minimum IEER	AHRI 1230
VRF Air Cooled, (cooling mode)	≥240,000 Btu/h	Electric Resistance (or none)	VRF Multi-split System[b]	9.1 EER Federal Minimum IEER	AHRI 1230
VRF Air Cooled, (heating mode)	<65,000 Btu/h (cooling capacity)	-	VRF Multi-split System	7.7 HSPF Before 1/1/2025 7.5 HSPF2 On or after 1/1/2025	AHRI 1230 Before 1/1/2025 AHRI 210/240 On or after 1/1/2025
VRF Air Cooled, (heating mode)	≥65,000 Btu/h and <135,000 Btu/h (cooling capacity)	-	VRF Multi-split System 47°F db/43°F wb outdoor air	Federal Minimum COP	AHRI 1230
VRF Air Cooled, (heating mode)	≥65,000 Btu/h and <135,000 Btu/h (cooling capacity)	-	VRF Multi-split System 17°F db/15°F wb outdoor air	2.25 COP	AHRI 1230
VRF Air Cooled, (heating mode)	≥135,000 Btu/h (cooling capacity)	-	VRF Multi-split System 47°F db/43°F wb outdoor air	Federal Minimum COP	AHRI 1230
VRF Air Cooled, (heating mode)	≥135,000 Btu/h (cooling capacity)	-	VRF Multi-split System 17°F db/15°F wb outdoor air	2.05 COP	AHRI 1230

[f] Deduct 0.2 from the required EERs and IEERs for Variable Refrigerant Flow (VRF) Multi-split system units with a heating recovery section.

Federal Standard – 10 CRF Part 431 Subpart F: Commercial Air Conditioners and Heat Pumps[g]

Table 16 to Paragraph (g)(2) – Updated Minimum Efficiency Standards for Variable Refrigerant Flow Multi-Split Air Conditioners and Heat Pumps:

Equipment Type	Size Category	Heating Type	Minimum Efficiency
VRF Air Cooled, (cooling mode)	≥65,000 Btu/h and <135,000 Btu/h	Heat Pump without Heat Recovery	14.6 IEER, 3.3 COP
VRF Air Cooled, (cooling mode)	≥65,000 Btu/h and <135,000 Btu/h	Heat Pump with Heat Recovery	14.4 IEER, 3.3 COP
VRF Air Cooled, (cooling mode)	≥135,000 Btu/h and <240,000 Btu/h	Heat Pump without Heat Recovery	13.9 IEER, 3.2 COP
VRF Air Cooled, (cooling mode)	≥135,000 Btu/h and <240,000 Btu/h	Heat Pump with Heat Recovery	13.7 IEER, 3.2 COP
VRF Air Cooled, (heating mode)	≥240,000 Btu/h and < 760,000 Btu/h	Heat Pump without Heat Recovery	12.7 IEER, 3.2 COP
VRF Air Cooled, (heating mode)	≥240,000 Btu/h and < 760,000 Btu/h	Heat Pump with Heat Recovery	12.5 IEER, 3.2 COP

2025 CA Title 24, Part 6, Section 110.12– Mandatory Requirements for Demand Management

110.12(a) Demand responsive controls*:*

1. *All demand responsive controls shall be either:*
   A. *A certified OpenADR 2.0a or OpenADR 2.0b Virtual End Node (VEN), as specified under Clause 11, Conformance, in the applicable OpenADR 2.0 Specification; or a certified Baseline Profile OpenADR 3.0 Virtual End Node; or*
   B. *Certified to the Energy Commission as being capable of responding to a demand response signal from a certified OpenADR 2.0b or a certified Baseline Profile OpenADR 3.0 Virtual End Node by automatically implementing the control functions requested by the Virtual End Node for the equipment it controls.*
2. *All demand responsive controls shall be capable of communicating with the VEN using a wired or wireless bidirectional communication protocol.*
3. *RESERVED*
4. *When the demand response signal is disabled or unavailable, all demand responsive controls shall continue to perform all other control functions provided by the control.*
5. *Demand responsive control thermostats shall comply with Reference Joint Appendix 5 (JA5), Technical Specifications for Occupant Controlled Smart Thermostats.*

110.12(b) Demand responsive zonal HVAC controls*:*

Nonresidential HVAC systems with DDC to the Zone level shall be programmed to allow centralized demand shed for noncritical zones as follows:

1. *The controls shall have a capability to remotely increase the operating cooling temperature set points by 4 degrees or more in all noncritical zones on signal from a centralized contact or software point within an Energy Management Control System (EMCS).*

[g] https://www.ecfr.gov/current/title-10/chapter-II/subchapter-D/part-431/subpart-F. Title 10 last amended on 01/08/2026.

2. *The controls shall have a capability to remotely decrease the operating heating temperature set points by 4 degrees or more in all noncritical zones on signal from a centralized contact or software point within an EMCS*
3. *The controls shall have capabilities to remotely reset the temperatures in all noncritical zones to original operating levels on signal from a centralized contact or software point within an EMCS.*
4. *The controls shall be programmed to provide an adjustable rate of change for the temperature increase, decrease, and reset.*
5. *The controls shall have the following features:*
    A. *Disabled. Disabled by authorized facility operators; and*
    B. *Manual control. Manual control by authorized facility operators to allow adjustment of heating and cooling set points globally from a single point in the EMCS; and*
    C. *Automatic Demand Shed Control. Upon receipt of a demand response signal, the space-conditining systems shall conduct a centralized demand shed, as specified in Sections 110.12(b)1 and 110.12(b)2, for noncritical zones during the demand response period.*

2025 CA Title 24, Part 6, Section 120.2– Required Controls for Space-Conditioning Systems

120.2(b) Criteria for zonal thermostatic controls*:*

4. Thermostatic controls for all single zone, air conditioners and heat pumps shall comply with the requirements of Sections 110.2(c) and 110.12(a) and, if equipped with DDC to the Zone level, with the Automatic Demand Shed Controls of Section 110.12(b).

Exception 1 to Section 120.2(b)4: *Systems serving non-covered process loads that must have constant temperatures to prevent degradation of materials, a process, plants or animals.*

Exception 2 to Section 120.2(b)4: *Package terminal air conditioners, package terminal heat pumps, room air conditioners and room air conditioner heat pumps.*

Exception 3 to Section 120.2(b)4: *Systems serving healthcare facilities.*

2025 CA Title 24, Part 6, Section 140.4– Prescriptive Requirements for Space Conditioning Systems

140.4(g) Electric resistance heating*:*

Electric resistance heating systems shall not be used for space heating.

Exception 1 to Section 140.4(g): *Where an electric resistance heating system supplements a heating system in which at least 60 percent of the annual energy requirement is supplied by site-solar or recovered energy.*

Exception 2 to Section 140.4(g): *Where an electric resistance heating system supplements a heat pump heating system, and the heating capacity of the heat pump is more than 75 percent of the design heating load calculated in accordance with Section 140.4(a) at the design outdoor temperature specified in Section 140.4(b)4.*

Exception 3 to Section 140.4(g): *Where the total capacity of all electric resistance heating systems serving the entire building is less than 10 percent of the total design output capacity of all heating equipment serving the entire building.*

Exception 4 to Section 140.4(g): *Where the total capacity of all electric resistance heating systems serving the entire building, excluding those allowed under Exception 2, is no more than 3 kW.*

Exception 5 to Section 140.4(g): *Where an electric resistance heating system serves an entire building that is not a hotel/motel building; and has a conditioned floor area no greater than 5,000 square feet; and has no mechanical cooling; and is in an area where natural gas is not currently available.*

Exception 6 to Section 140.4(g): *Heating systems serving as emergency backup to gas heating equipment.*

Exception 7 to Section 140.4(g): *Supplemental electric resistance heating systems complying with Section 140.4(a)3C.*

2025 CA Title 24, Part 6, Section 160.3– Mandatory Requirements for Space Conditioning Systems in Multifamily Buildings

160.3(c) Heat pump controls*:*

All heat pumps with supplementary electric resistance heaters shall be installed with controls that comply with Section 110.2(b).

Eligible Climate Zones and Building Types

Eligible Climate Zones

This high-performance measure is applicable in all **California Climate Zones 1-16** (Title 24); however, there is high interest in projects from climate zones 5, 11, 13, 14, and 16. Applicants must identify the project's climate zone in the submittal.

Eligible Building Types

This high-performance measure applies to:

- **High-Rise Multifamily**: Buildings with **four (4) or more habitable stories above grade**.
- **Nonresidential**: Commercial, public, agricultural, and industrial facilities (e.g., offices, retail, lodging, education, healthcare, food service, warehouses, manufacturing, civic buildings).

Eligible Project Scopes

This high-performance measure applies to:

- **New construction**, **additions**, and **major alterations/retrofits** installing qualifying cold climate variable refrigerant flow or multi-zone heat pump system(s).

Measure Exclusions

This high-performance measure excludes the following system types and applications:

- Water source heat pumps (including water-source VRF variants)
- Water-to-water heat pumps
- Single-zone heat pump systems, including unitary, packaged, or ductless systems serving only one indoor unit
- Collections of independent or paired mini-split systems that do not operate as a single, integrated multi-zone refrigerant system under a centralized, manufacturer-provided system controller
- Air-source heat pumps used primarily for process heating
- Air-source heat pumps used for service or domestic hot water heating

Projects installing air-to-air heat pump systems certified solely under AHRI 210/240, 310/380, or 390 are not eligible under this measure unless the system is an integrated multi-zone VRF / multi-split configuration <65,000 Btu/h that meets the Essential Alternative Pathway (AHRI 210/240 certification for the multi-zone configuration, manufacturer system-level control, coordinated defrost operation, and verifiable COP @ 17°F performance documentation). Systems that do not meet this exception may be evaluated under the Cold Climate Air-to-Air Heat Pump (ccASHP) HPM, where applicable.

Systems that meet the above exclusions are considered outside the intended scope of this measure regardless of manufacturer marketing language or product names. Submitted AHRI listings, manufacturer performance tables, and control screenshots must match the installed configuration; mismatches will require clarification or may be rejected.

Projects participating under this measure are not eligible to concurrently claim inducements under the CEDA Defrost Controls for Air-to-Air Heat Pump HPM for the same installed equipment or system scope. For unusual or borderline configurations, project teams should request pre-approval from the program technical lead prior to application submission.

Reviewer Checklist

High-Performance Measure Review Checklist: Cold Climate Variable Refrigerant Flow

Checklist Description: This checklist captures the elements that must be present in the project design to be eligible for the high-performance measure inducement or consideration for additional site metering.

Project Name: _____ **Review Date:** _____

Assessment:

- ☐ Approved
- ☐ Not approved

Notes:

Reviewer: _____ **Signature:** _____

System Design Requirements – Essential Level	Comments

General:

- ☐ **Eligible system type**: Air-source, refrigerant-based multi-zone VRF/MZHP serving multiple indoor units from one or more outdoor units (§1.1.1–§1.1.2).
- ☐ **Integrated system requirement**: Single, integrated refrigerant system with system-level coordination of capacity and defrost (§1.1.2).
- ☐ **Applicable configurations**: Non-ducted, ducted, or mixed ducted/non-ducted indoor unit configurations (§1.2.1).

§1.2.2 Certification pathway (select one):

- ☐ **Path A (≥65,000 Btu/h):** AHRI 1230-2023 certification provided, verifiable in AHRI Directory, reflecting installed configuration (matched combinations / indoor unit configuration where applicable) (§1.2.2.1).
- ☐ **Path B (<65,000 Btu/h Alternative Pathway):** AHRI 210/240 certification provided for a multi-zone VRF/multi-split configuration reflecting installed scope (§1.2.2.2).

§1.2.3 Performance compliance (based on pathway):

- ☐ **Path A (≥65k, AHRI 1230):** Meets applicable IEER + COP @ 47°F + COP @ 17°F minimums for the capacity category (AHRI-certified/verifiable) (§1.2.3–§1.2.3.1).
- ☐ **Path B (<65k):** Meets minimum AHRI-rated efficiencies for the 210/240 pathway (SEER2/HSPF2 as applicable) (§1.2.3.2.1).
- ☐ **Path B (<65k):** COP @ 17°F ≥ 2.0 is verifiable from manufacturer extended performance data tied to installed outdoor unit + compatible indoor unit series/configuration (heat pump operation only) (§1.2.3.2.2).
- ☐ **COP @ 5°F reported if available**: COP @ 5°F data provided when available (informational only for Essential) (§1.2.3.1 Note / §1.2.3.2.3).

§1.3 Controls:

- ☐ **System-native controller provided**: Manufacturer-provided, system-native controller required for normal operation (§1.3.1).
- ☐ **Path A (≥65k):** Controller is certified as part of AHRI 1230-listed configuration (§1.3.1.1).
- ☐ **Path B (<65k):** Manufacturer system-level controller documented as required for normal multi-zone operation and coordinated defrost sequencing (§1.3.1.2).

- ☐ **Controller coordination functions**: Coordinates refrigerant flow, compressor operation, zone demand aggregation, and defrost sequencing (§1.3.1).

§1.4 Defrost:

- ☐ **Automatic system defrost**: Automatic, system-coordinated defrost managed by controller with stable post-defrost return (§1.4.1).

System Design Requirements – Premium Level	Comments

- ☐ **Primary heating intent**: System intended for primary space heating and designed/configured to carry the full design heating load at outdoor design temperature under normal operation (§2.1.1, §2.3.1).
- ☐ **Backup heat limits**: Backup/supplemental heat is limited to emergency/safety functions or manufacturer-initiated defrost/recovery only (not required for normal space-heating operation) (§2.1.1, §2.3.1).
- ☐ **Eligible system architecture**: Multi-zone, integrated refrigerant system serving multiple indoor units under a manufacturer-provided system-level controller (§2.1.2).
- ☐ **Applicable configurations:** Non-ducted, ducted, or mixed ducted/non-ducted indoor unit configurations (§2.2.1).
- ☐ **AHRI certification (required):** System is AHRI 1230-2023 certified, verifiable in AHRI Directory, reflecting the installed configuration (§2.2.2).
- ☐ **Minimum efficiency thresholds met**: Meets applicable IEER + COP @ 47°F + COP @ 17°F minimums for the capacity category (§2.2.3–§2.2.3.1).
- ☐ **COP @ 5°F rule applied (Premium Add):**
    - If COP @ 5°F is provided for the submitted AHRI-listed configuration (AHRI directory/certificate) or via manufacturer extended performance data explicitly tied to the same AHRI-listed outdoor unit and compatible indoor unit series/configuration, the system meets the applicable Premium COP @ 5°F threshold (§2.2.4.1–§2.2.4.3).
    - If COP @ 5°F is not listed/provided for that configuration, Premium eligibility is determined based on the required IEER + COP @ 17°F criteria (§2.2.4.2–§2.2.4.3).
- ☐ **Advanced controls + stable defrost/recovery**: System-level controller supports coordinated defrost sequencing, controlled post-defrost recovery, and prevention of unstable operating states (e.g., rapid mode switching or conflicting zone demands) (§2.4.1).
- ☐ **Operational observability/trending**: Controller provides visibility into operating mode (heating/cooling/defrost/recovery), compressor operation/loading (or equivalent indicators), and faults/alarms; data available at ≤ 1-minute intervals (trend logs/exports/equivalent) (§2.4.2).
- ☐ **Power/energy monitoring or estimation**: System-level electrical power/energy monitoring or manufacturer-supported

estimation supports load profiling and performance evaluation (§2.4.3).

- ☐ **DR readiness**: DR-ready consistent with Title 24, Part 6, §110.12(a); can receive an external DR signal and implement controlled setpoint adjustments with stable recovery (§2.5.1).

Supporting Documentation Requirements – Essential Level	Comments

General:

- ☐ **Equipment schedule/submittals provided**: Manufacturer, model(s), outdoor unit(s), indoor unit types/count, and configuration (ducted/non-ducted/mixed) (§1.1.1).

Certification + performance pathway (select one):

- ☐ **Path A (≥65,000 Btu/h)** — AHRI 1230 documentation
  - **AHRI 1230 certification proof provided**: AHRI certificate/directory printout reflecting the installed configuration (matched combinations / indoor unit configuration where applicable) (§1.1.2; §1.2.2.1).
  - **AHRI performance proof provided**: AHRI-certified performance data showing required IEER + COP @ 47°F + COP @ 17°F for the applicable capacity category (§1.2.1; §1.2.3–§1.2.3.1).
  - **COP @ 5°F reported if available (info only):** AHRI listing or manufacturer data provided when available (§1.2.2; §1.2.3.1 Note).
- ☐ **Path B (<65,000 Btu/h)** — Alternative Pathway documentation
  - **AHRI 210/240 certification proof provided**: AHRI certificate/directory printout for a multi-split/VRF configuration reflecting installed outdoor unit and compatible indoor unit series/configuration (§1.2.2.2).
  - **COP @ 17°F verification provided**: Manufacturer extended performance data (or equivalent published engineering tables) tied to the installed outdoor unit and compatible indoor unit series/configuration demonstrating COP @ 17°F ≥ 2.0 (heat pump operation only) (§1.2.2.2; §1.2.3.2.2).
  - **COP @ 5°F provided if available (info only):** Manufacturer data provided when available (§1.2.3.2.3).
  - **Minimum AHRI 210/240 efficiency documentation provided (as applicable**): Evidence the submitted configuration meets the applicable AHRI-rated efficiencies (SEER2/HSPF2 as applicable) (§1.2.3.2.1).

Controls + defrost (applies to both pathways):

- ☐ **Controller documentation provided**: Documentation identifying the manufacturer system-native controller and system-level coordination capability (§1.3.1).
- ☐ **Defrost strategy documentation provided**: Evidence of automatic, system-coordinated defrost (controls documentation, sequence excerpt, or control narrative) (§1.3.2; §1.4.1).

Installation + cost (applies to both pathways):

- ☐ **Installation photos provided**: Outdoor unit(s) and representative indoor unit(s); nameplates visible where practical (§1.4.1).
- ☐ **Cost document provided**: At least one document with pricing (proposal/quote/estimate) sufficient to identify major system components (outdoor units, indoor units, branch components, system controller) (§3.1).

Supporting Documentation Requirements – Premium Level	Comments

- ☐ **Equipment schedule/submittals provided**: Manufacturer, model(s), outdoor unit(s), indoor unit types/count, and system configuration (§2.1.2).
- ☐ **AHRI 1230 certification proof provided**: AHRI certificate/directory printout reflecting the installed configuration (§2.2.2).
- ☐ **AHRI performance proof provided**: AHRI-certified performance data showing required IEER + COP @ 47°F + COP @ 17°F for the applicable capacity category (§2.2.3–§2.2.3.1).
- ☐ **COP @ 5°F documentation provided (when applicable):**
    - If COP @ 5°F is provided for the submitted AHRI-listed configuration (AHRI directory/certificate) or via manufacturer extended performance data explicitly tied to the same AHRI-listed outdoor unit and compatible indoor-unit series/configuration, documentation shows compliance with the Premium COP @ 5°F threshold (§2.2.4.1–§2.2.4.3).
    - If COP @ 5°F is not listed/provided for that configuration, Premium eligibility is evaluated based on the required IEER + COP @ 17°F criteria (§2.2.4.2–§2.2.4.3).
- ☐ **Primary heat design intent proof provided**: Brief narrative or calculation excerpt showing system is designed to meet 100% of design heating load at outdoor design temperature under normal operation (§2.3.1).
- ☐ **Backup heat limits documented (if applicable):** Evidence backup/supplemental heat is emergency/safety only (sequence excerpt, control narrative, schedule notes, or supplemental heat schedule) (§2.3.2).
- ☐ **Controls/defrost coordination documentation provided**: Controls submittal or manufacturer documentation describing controller role coordinating multi-zone operation, defrost sequencing, and post-defrost recovery (§2.4.1).
- ☐ **Observability evidence provided**: Screenshot(s)/export(s)/trend logs showing ≤1-minute interval data with visibility of:

- operating mode (heating/cooling/defrost/recovery),
- compressor loading/operation (or equivalent system status indicators), and
- faults/alarms (where applicable) (§2.4.2).

☐ **Power/energy monitoring evidence (if available):** Screenshot(s)/documentation showing system-level electrical power/energy monitoring or manufacturer-supported estimation (§2.4.3).

☐ **DR-ready evidence provided (Title 24 §110.12(a)):** One or more items demonstrating DR capability (controlled setpoint adjustment + stable recovery) and supported interface/pathway as applicable (§2.5.1).

☐ **Installation photos provided**: Outdoor unit(s), representative indoor unit(s), and controller/interface sufficient to confirm installed scope (§2.6.1).

☐ **Cost document provided**: At least one pricing document (proposal/quote/estimate) sufficient to identify major system components (outdoor units, indoor units, branch components, system controller) (§3.1).

☐ **Premium adders priced (if applicable):** Added pricing for advanced controls/monitoring features used to meet Premium requirements (§3.2)

Version History Log

Version	Effective Date	End Date	Change Description
1	January 17, 2024	May 15, 2024	Original memo with AAHP and VRF together
2	May 16, 2025	February 08, 2026	Split VRF systems into its own memo
3	February 09, 2026	Current	Updated format, established Essential/Premium tier requirements and supporting documentation; added incremental cost, updated code references, added eligibility/exclusions and created reviewer checklist.