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Field Experts Proposed Measures - Alternate Verification of Weigh-In Observation Through Rater-Verified Photo Documentation

Additional submitted attachment is included below.

CHEERS

FIELD EXPERT PROPOSED MEASURES

Response to CEC Comments

Alternate Verification of Weigh-In Observation Through Rater-Verified Photo Documentation

Document Overview

This package consolidates CHEERS' response to Commission comments on the Field Expert Proposed Measure related to alternate verification of weigh-in observation through Rater-verified photo documentation.

The document is organized as follows:

- **Response to CEC Comments – Alternate Verification of Weigh-In Observation Through Rater-Verified Photo Documentation**
  Contains CHEERS' responses to Commission questions and comments, clarification of scope and applicability, a proposed verification process, and a discussion of current pain points and benefits.

- **Appendix A – Original Field Expert Proposed Measure**
  Original proposal as submitted by CHEERS, included for reference and continuity.

- **Appendix B – CEC Comments**
  CEC initial comments on the proposed measure (01/22/2026)

Response to CEC Comments – Alternate Verification of Weigh-In Observation Through Rater-Verified Photo Documentation

Section 1 – Responses to CEC Comments

CEC Comment 1:

This would be a large improvement if a solution could be identified such that all installers and raters could use the revised method consistently and reliably. A metadata-based protocol would rely on machine validation.

Response:

CHEERS agrees that this would create consistency and reliability if structured properly.

The proposal is intended to function as a data-based protocol. Machine validation may be used by the Provider to confirm required elements such as time sequencing, location consistency, and completeness of documentation.

The Provider can validate structural and metadata elements at the registry level. The Rater then performs the human verification function by reviewing documentation for technical consistency with installer declarations, manufacturer requirements, and observed field conditions.

This layered approach allows machine validation and professional judgment to operate together without expanding technical requirements or altering installer obligations.

CEC Comment 4:

How feasible would this be for a Rater to do all of this while conducting testing? How often is this test conducted/used? Is there really an impact if the procedure is changed? Need to think about additional cost, if any.

Response:

This approach is feasible because it applies only in cases where weigh-in observation is an allowed refrigerant charge verification pathway. In those cases, the Rater's core responsibilities do not change. The Rater still performs an on-site visit, confirms installed equipment (model and serial number), and reviews manufacturer charging requirements. The only procedural difference is that, when real-time presence during the weigh-in event is impractical, the Rater reviews installer-provided photo documentation rather than witnessing the event live. This approach does not apply when standard refrigerant charge testing is required, and it does not replace any testing pathway that is otherwise mandated.

Historically, weigh-in observation has been used less frequently than other refrigerant charge verification methods. However, its use is increasing as inverter-driven and variable-capacity

equipment becomes more prevalent. Many of these systems do not support traditional refrigerant charge testing using gauges under normal operating conditions. The importance of this proposal is not the overall historical frequency of weigh-in observation, but that when weigh-in observation is required and real-time Rater attendance cannot occur, the current system produces little to no verifiable evidence for QA or program oversight.

The charging procedure itself is not changed. Installer obligations and manufacturer requirements do not change. The impact of this proposal is evidentiary and administrative. Under current conditions, when weigh-in observation cannot be witnessed in real time, there is no reliable mechanism for QA to verify that the procedure occurred as documented. This proposal introduces verifiable documentation in those limited scenarios, improving post-installation oversight and compliance review without changing technical requirements or expanding enforcement scope.

This proposal is designed to reduce total system cost by reducing coordination failures, repeat trips, and rework associated with missed observation timing. Providers may incur minor incremental cost if they elect to support structured photo upload and retention, which is why the pathway is optional. Rater and installer costs are expected to decrease through reduced scheduling constraints and reduced rework, which can indirectly reduce homeowner costs.

CEC Comment 5: One of the nice things about this proposal is that photo and video verification was tried during COVID by AHJs, with varying degrees of success. We would need to consider how to avoid manipulation of the photo or video. This was considered during 2025 rulemaking so there has been some thought about it.

Response:

The proposal does not rely on photo documentation as a standalone determination. Photo documentation supports Rater review and QA reconciliation by providing a record of installation activities in situations where real-time observation is not feasible. Combined with Rater on-site verification and Quality Assurance review, this documentation materially improves confidence relative to scenarios where no documentation is available.

CEC Comment 6: It would be nice to have a simpler method, weigh-in is complex, and if this is really being considered we would need to look at it in detail starting with an in-field example.

Response:

We agree that weigh-in observation can be inherently complex due to manufacturer requirements and the technical nature of refrigerant evacuation and charging. This proposal does not increase or decrease that complexity. It documents and structures a process that already must occur.

A detailed step-by-step workflow is provided in **Section 2 – Proposed Process.**

CEC Comment 7: How do we coordinate this across providers? How would quality assurance be supported by the Provider? Is there a method that meets all the requirements and technical challenges in the market right now?

Response:

Coordination can be achieved through a uniform process expectation. The Commission would define minimum documentation expectations, while Providers retain flexibility to implement this optional pathway within their existing registry architectures.

Providers support QA by retaining documentation associated with the alternate pathway and making it available for review. This allows QA to reconcile installer declarations, Rater certification, and observed field conditions during audits, improving oversight.

We are aware of no existing method in widespread use that preserves verifiable evidence of weigh-in observation when real-time Rater attendance is impractical, while remaining compatible with existing registry systems and field practices. This proposal is intended to address that gap using tools and practices already familiar to the industry.

CEC Comment 8: AHJ feedback has indicated that many HVAC permits aren't finaled, and often because of the refrigerant charge verification at the time of year the change-out happens. So if this proposal could simplify that process and result in permit finals, that could be a benefit.

Response:

This proposal directly supports more timely permit finalization.

Refrigerant evacuation and weigh-in charging are timing-dependent verification events. When real-time Rater observation does not occur, there is currently no mechanism to preserve verifiable documentation of the event. As a result, projects may remain open while waiting for alternative testing conditions or other verification pathways.

By preserving structured documentation at the time the weigh-in occurs, the alternate pathway reduces the likelihood that a missed observation event will delay compliance documentation and permit closure, while maintaining compliance integrity.

Section 2 – Proposed Process for Alternate Verification of Weigh-In Observation Through Rater-Verified Photo Documentation

Scope and Applicability

1. This alternate verification process may only be used when weigh-in observation is an allowed refrigerant charge verification pathway.
2. This alternate verification process shall not be used when a standard refrigerant charge test is required.
3. This alternate verification process does not replace the Rater's on-site visit.
4. This alternate verification process allows the weigh-in charging event to be verified without requiring the Rater to be physically present during the evacuation and charging process, provided the required photo documentation is captured and reviewed as part of the Rater's verification.

Installer Responsibilities

Installer – Existing Requirements

The installer shall perform all refrigerant charging activities and associated documentation in accordance with applicable requirements, including:

- Performing system evacuation per manufacturer instructions.
- Charging the system by weight when weigh-in observation is applicable.
- Declaring total installed refrigerant line set length.
- Declaring total refrigerant charge added by weight.
- Completing required installer certifications.

Installer – Additional Documentation for Alternate Pathway

When this alternate pathway is used, the installer shall additionally:

- Capture photo documentation of required installation activities.
- Upload photo documentation for Rater review.

Rater Responsibilities

Rater – Existing Verification Activities

The Rater shall:

- Conduct an on-site visit.
- Verify outdoor unit manufacturer, model, and serial number.

- Review installer-declared refrigerant line set length and refrigerant charge.
- Review manufacturer installation instructions as needed to determine compliance.

Rater – Additional Verification for Alternate Pathway

When the alternate pathway is used, the Rater shall:

- Review installer photo documentation.
- Use documentation to support review of installer declarations.
- Certify compliance only when documentation and observations are consistent.
- Revert to standard verification requirements if documentation is insufficient.

Required Photo Documentation

- Outdoor unit nameplate with model and serial number.

- Micron gauge showing evacuation to 500 microns or less.

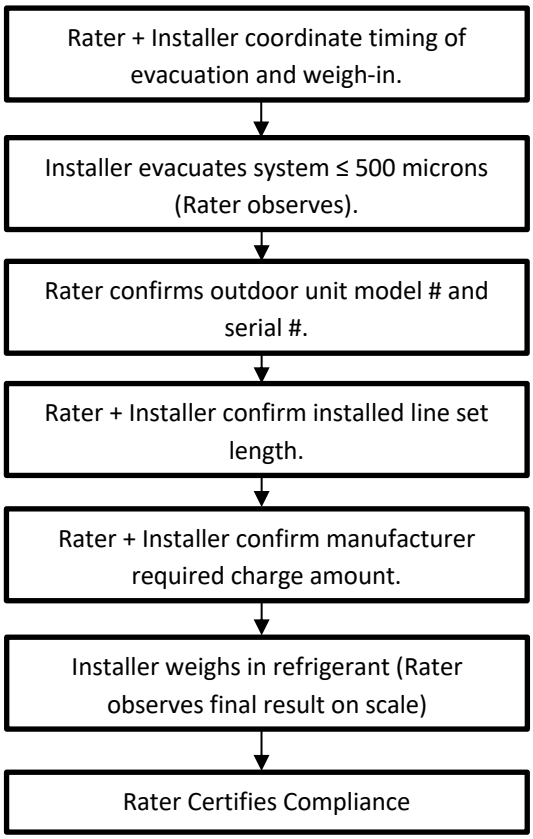
- Refrigerant cylinder on scale showing final charge by weight.

Provider Responsibilities

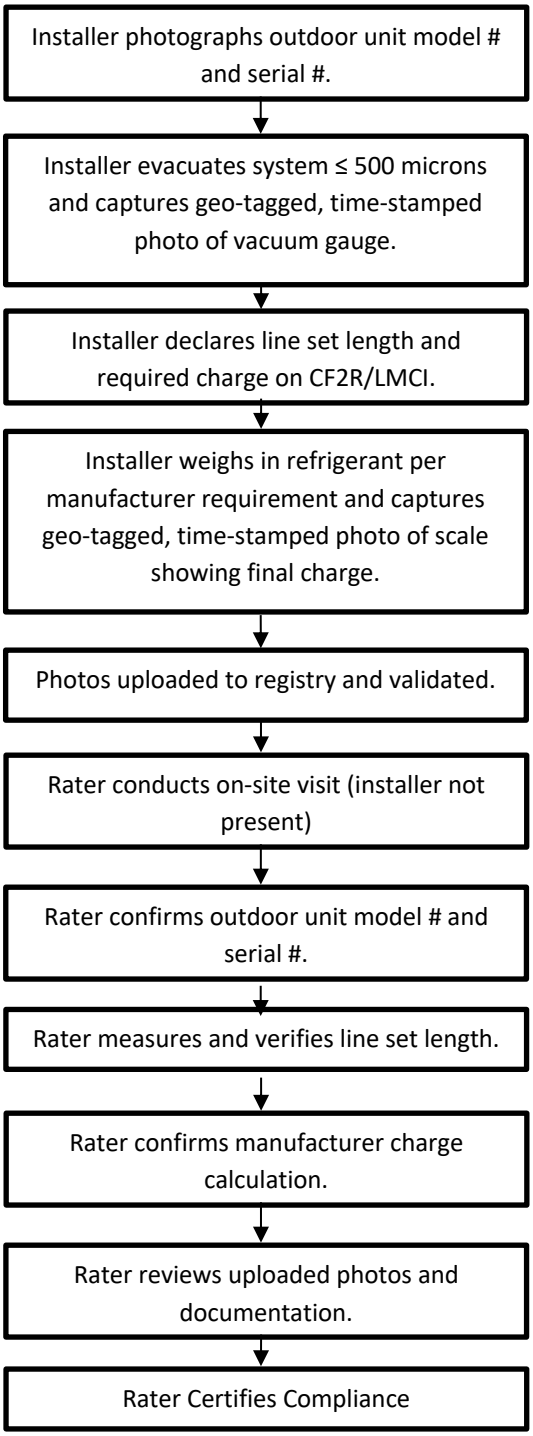
- Providers may optionally support this pathway by enabling photo upload, notification, and document retention.
- Providers shall retain documentation. QA may reconcile documentation with field conditions during audits.

PROCESS FLOW COMPARISON

Current Model – Live Observation



Proposed Model – Photo-Verified Pathway



Section 3 – Current Pain Points and Benefits

Current Pain Points

Weigh-In Observation Cannot Be Verified After the Fact

When weigh-in observation is the applicable refrigerant charge verification pathway and the Rater is not present during evacuation and charging, there is no meaningful way to verify compliance after the fact. Unlike many other Energy Code Compliance Field Verification and Diagnostic Testing requirements, which can be tested diagnostically or evaluated after installation, refrigerant evacuation and charging cannot be re-observed or independently confirmed once completed. In these situations, the system provides no verifiable record that can be reviewed by Providers or Quality Assurance.

Scheduling and Coordination Constraints

Refrigerant evacuation and charging are often driven by construction sequencing, installer availability, and environmental conditions. Coordinating real-time Rater presence at the exact moment of weigh-in can be difficult. When real-time observation cannot occur, the current process offers no practical alternative for preserving verification documentation.

Recovery and Re-Charging as the Only Post-Hoc Remedy

When weigh-in observation is required and missed, the only way to recreate it is to recover the refrigerant, open the system again, repeat evacuation, and then re-charge by weight in the presence of a Rater. That process adds labor and cost, requires specialized equipment, and forces additional refrigerant handling and reconnections that provide no performance benefit. Each additional recovery, vacuum, and re-charge cycle increases the chance of errors such as leaks, contamination or moisture introduction, improper evacuation, or incorrect final charge, creating avoidable risk for the homeowner.

Permit Delays and Administrative Friction

When weigh-in observation cannot be completed or documented, projects may stall while verification issues are resolved, delaying permit finalization and creating downstream impacts for homeowners and builders.

Quality Assurance Limitations

Quality Assurance cannot retroactively observe refrigerant evacuation or charging. When no documentation exists, QA review is limited to installer declarations alone, without supporting evidence that can be reconciled during an audit.

Increasing Reliance on Weigh-In Observation Due to Equipment Trends

The growing use of inverter-driven and variable-capacity equipment limits the applicability of traditional refrigerant charge testing methods. As these systems become more prevalent, reliance on weigh-in observation is expected to increase, magnifying the impact of the existing verification gap.

Benefits of the Proposed Measure

Provides a Verifiable Record Where None Exists Today

The proposed pathway preserves documentation of weigh-in charging activities in situations where real-time observation is not feasible, providing a verifiable record that can be reviewed by the Rater.

Avoids Unnecessary Refrigerant Recovery and System Rework

By providing an alternate method to document weigh-in charging, the pathway reduces the need to recover and re-charge refrigerant solely for verification purposes, avoiding unnecessary cost, labor, and additional system handling.

Maintains Existing Technical and Compliance Requirements

The proposal does not change installer obligations, manufacturer requirements, or refrigerant charging procedures. It documents activities that are already required and declared under the existing regulatory framework.

Improves Quality Assurance Review Capability

Retained documentation enables QA to reconcile installer declarations, Rater certification, and observed field conditions during audits, improving QA oversight.

Reduces Coordination Failures and Project Delays

Allowing photo documentation review reduces scheduling conflicts and friction when real-time observation cannot occur.

Supports Timely Permit Finalization by AHJs

AHJs require completed compliance documentation in order to issue a permit final. The proposed pathway provides a mechanism for compliant documentation to be produced efficiently, allowing for permit finalization to be issued.

Aligns With the Consumer Protection Goals of the Energy Code

By reducing unnecessary rework, additional refrigerant handling, and system disturbance, the proposed pathway helps minimize future system risk and cost to the homeowner.

Section 4 – Cost and Benefits Summary

Purpose and Method

This measure does not change the charging procedure or technical requirements. It changes only how the weigh-in event is verified. This cost summary compares: (1) the extra cost created by live observation (installer and ECC Rater coordination, waiting, and witnessing), (2) the added cost of the photo pathway (photo capture/upload and photo review), (3) the resulting net savings when the photo pathway replaces live observation, and (4) the cost impact when live observation is missed and the verification must be remedied.

Cost Basis (How the Rates Were Derived)

Labor costs are shown using government-published bases: (a) BLS California OEWS hourly mean wages and (b) California DIR prevailing wage determinations using the straight-time total hourly rate.[1,2,3,4]

DIR prevailing wage determinations are used in this section only as an all-in labor cost benchmark ("total hourly rate"), not as an applicability requirement for private-market work.

Inputs Used in the Calculations

The values below are used throughout this section:

- Installer hourly rate (BLS OEWS, CA): $30/hour (HVAC mechanics/installers).[1]
- ECC Rater hourly rate proxy (BLS OEWS, CA): $47/hour (construction/building inspectors used as a wage proxy for field inspection time).[2]
- Installer “all-in” hourly rate benchmark (DIR total hourly rate): $97/hour (HVAC/refrigeration trade).[3]
- ECC Rater “all-in” hourly rate benchmark (DIR Building/Construction Inspector total hourly rate examples): $79–$101/hour (NorCal example including Sacramento to SoCal example including Los Angeles).[4]

Time assumptions are listed in each section immediately before the calculations.

Baseline (Normal Method: Live Observation Extra Cost)

Live weigh-in observation creates extra time when compared to the traditional refrigerant charge verification approach because the installer and ECC Rater have to coordinate and be present at the same time during evacuation and charging.

Extra time caused by live observation (assumptions):

- Installer scheduling/coordination burden (can include a return trip): 0.5–2.5 hours
- ECC Rater coordination + waiting + witnessing: 0.5–2.0 hours

Cost estimate (three scenarios):

Low estimate (BLS wages for installer + BLS ECC Rater):

- Low case: (0.5 × $30) + (0.5 × $47) = $38
- High case: (2.5 × $30) + (2.0 × $47) = $169

Mid estimate (DIR installer all-in + BLS ECC Rater):

- Low case: (0.5 × $97) + (0.5 × $47) = $72
- High case: (2.5 × $97) + (2.0 × $47) = $337

High estimate (DIR installer all-in + DIR ECC Rater all-in):

- Low case: (0.5 × $97) + (0.5 × $79) = $88

- High case: (2.5 × $97) + (2.0 × $101) = $446

Photo Pathway (Incremental Work Only)

The photo pathway removes the need to coordinate and be there at the same time. The only added work is documentation and review.

Added time (assumptions):

- Installer photos + upload: 10 minutes
- ECC Rater photo review: 5 minutes

Cost estimate (three scenarios):

Low estimate (BLS wages for installer + BLS ECC Rater):

- (0.167 × $30) + (0.083 × $47) = $9 per project

Mid estimate (DIR installer all-in + BLS ECC Rater):

- (0.167 × $97) + (0.083 × $47) = $20 per project

High estimate (DIR installer all-in + DIR ECC Rater all-in):

- Low–high: (0.167 × $97) + (0.083 × $79 to $101) = $23–$25 per project

Registry photo storage cost is de minimis. Example: three (3) photos totaling ~3 MB stored for 24 months. Using AWS S3 Standard pricing ($0.023/GB-month for the first 50 TB/month tier), storage is approximately $0.002 per project over 24 months.[5]

Net Savings (Photo Pathway)

By using the photo pathway, the program avoids the extra coordination/wait/witness time required for live observation. Net savings is calculated as: (baseline live observation extra cost avoided) − (photo pathway documentation cost added).

Net savings (three scenarios):

Low estimate (BLS wages for installer + BLS ECC Rater):

- Low case: $38 avoided − $9 added = $30 *saved* per project
- High case: $169 avoided − $9 added = $160 *saved* per project

Mid estimate (DIR installer all-in + BLS ECC Rater):

- Low case: $72 avoided − $20 added = $52 *saved* per project
- High case: $337 avoided − $20 added = $317 *saved* per project

High estimate (DIR installer all-in + DIR ECC Rater all-in):

- Low case: $88 avoided − $23 added = $65 *saved* per project
- High case: $446 avoided − $25 added = $421 *saved* per project

Cost Impact When Live Observation Is Missed (Remedy)

If the normal weigh-in observation is missed and the photo pathway is not an available option, the only way to resolve the verification gap is to return to the jobsite and recreate the conditions needed for a compliant observation. In practice, this can require pumping refrigerant back into the condenser or performing full recovery as needed, repeating evacuation evidence, and then re-performing the weigh-in event with the ECC Rater present. These steps add labor time and create avoidable disruption that does not improve system performance.

Extra time for recreation (assumptions):

- Installer remedial labor: 1.5–3.0 hours
- ECC Rater time: 1.0–2.0 hours

Cost estimate (three scenarios):

Low estimate (BLS wages for installer + BLS ECC Rater):

- Low case: (1.5 × $30) + (1.0 × $47) = $92
- High case: (3.0 × $30) + (2.0 × $47) = $184

Mid estimate (DIR installer all-in + BLS ECC Rater):

- Low case: (1.5 × $97) + (1.0 × $47) = $193
- High case: (3.0 × $97) + (2.0 × $47) = $386

High estimate (DIR installer all-in + DIR ECC Rater all-in):

- Low case: (1.5 × $97) + (1.0 × $79) = $225
- High case: (3.0 × $97) + (2.0 × $101) = $494

Footnotes

1. BLS, California OEWS State Occupational Employment and Wage Estimates (May 2023), 49-9021 HVAC mechanics/installers hourly mean wage $29.92. https://www.bls.gov/oes/2023/may/oes_ca.htm

2. BLS, California OEWS State Occupational Employment and Wage Estimates (May 2023), 47-4011 construction/building inspectors hourly mean wage $47.00. https://www.bls.gov/oes/2023/may/oes_ca.htm

3. California DIR, Prevailing Wage Determinations (2025-2), PLUMBER/STEAMFITTER/REFRIGERATION FITTER (HVAC) straight-time total hourly rate $97.260. https://www.dir.ca.gov/oprl/2025-2/PWD/Determinations/Subtrades/STA.html

4. California DIR, Prevailing Wage Determinations (Building/Construction Inspector): NorCal example including Sacramento (NC-63-3-9-2024-1 Total Hourly Rate $79.06) and SoCal example including Los Angeles (SC-23-63-2-2025-1D Total Hourly Rates $99.53–$101.31). https://www.dir.ca.gov/oprl/2024-2/PWD/Determinations/Northern/NC-063-3-9.pdf ; https://www.dir.ca.gov/oprl/2025-2/PWD/Determinations/Southern/SC-023-63-2%28D%29.pdf

5. AWS, Amazon S3 pricing (S3 Standard $0.023/GB-month for first 50 TB/month tier), accessed 2026-03-25. https://aws.amazon.com/s3/pricing/

Appendix A – Original Field Expert Proposed Measure

Measure Summary

Required Summary Element	Response
Measure Name & Proponent	Alternate Verification of Weigh-In Observation Through Rater-Verified Photo Documentation – Proposed by CHEERS (Energy Code Compliance Provider)
Building Type	All existing residential buildings, single-family and multifamily, limited initially to mechanical change-outs and alterations where the weigh-in charging procedure is allowed in lieu of standard refrigerant charge testing.
Building System	HVAC Field Verification and Diagnostic Testing (FVDT) under the Energy Code Compliance (ECC) framework – specifically refrigerant charge verification conducted through the weigh-in charging procedure described in RA3.2.3.1 and RA3.2.3.2 of the Reference Residential Appendices.

Required Summary Element	Response
Measure Description	This proposal establishes an alternate verification pathway for refrigerant charge weigh-in observations, allowing the ECC Rater to verify the procedure through a structured photo documentation protocol rather than in-person attendance. The intent is to maintain procedural integrity and verifiable accountability when environmental or operational conditions make direct observation impractical — for example: • When outdoor air temperatures are below 55 °F • When the HVAC system uses inverter-driven or variable-speed technology not suited for standard charge testing • When scheduling constraints prevent the Rater from being on site during the weigh-in event This alternate verification method shall only be permitted in these limited circumstances and shall not be used when standard refrigerant charge verification or in-person Rater observation is available and feasible. Under this measure: • The installer must capture a prescribed sequence of geo-tagged, time-stamped photographs documenting each critical step of the weigh-in charging process. • The ECC Rater reviews these photos and validates the authenticity, completeness, and metadata to confirm that the weigh-in procedure was performed in accordance with RA3.2.3.1, RA3.2.3.2, and manufacturer specifications. • The ECC Provider registry automatically validates that: – Each image retains original metadata (time, date, GPS coordinates) – The GPS coordinates correspond to the registered project address within an acceptable proximity – The sequence of timestamps is continuous and logically consistent • If any photo fails metadata validation, or if the required sequence is incomplete, the alternate verification method is invalid, and the Rater must revert to the standard in-person weigh-in observation in accordance with RA3.2.3.2. • When all verification criteria are met, the Rater certifies the weigh-in as “photo-verified” on the CF3R or LMCV form, maintaining full equivalency to a direct observation. This alternate pathway is limited to existing-home mechanical change-outs where project locations can be reliably mapped and verified. It is intended to supplement, not replace, traditional in-person Rater verification procedures and must not be used in situations where the Rater can be physically present to conduct a standard verification.

Required Summary Element	Response
Justification	Under current Energy Code procedures, the weigh-in charging process must be witnessed by a certified ECC Rater. However, in practice, coordinating this observation is often extremely difficult. The timing of pulling a vacuum and completing a weigh-in is unpredictable and dependent on several field factors — such as weather conditions, equipment readiness, or crew scheduling. When the Rater cannot arrive at the exact time the system is ready for weigh-in, the compliance documentation cannot be completed or finalized in the registry. This prevents the project from being closed out and the homeowner from receiving full compliance certification, creating frustration for both the installer and the customer. To avoid these delays and the associated homeowner complaints, installers and Raters are sometimes left with two unsatisfactory choices: 1. Recover all refrigerant and repeat the entire weigh-in procedure once the Rater is available — an expensive, time-consuming, and labor-intensive process that few homeowners will agree to; or 2. Proceed without true Rater observation, leading to falsified or unverifiable documentation in order to move the project forward. This creates a systemic compliance problem: there is often no verifiable evidence that a proper weigh-in was performed, yet the system is certified as compliant. This condition undermines both the Rater's certification responsibility and the Provider's ability to conduct meaningful Quality Assurance reviews. This measure provides a practical and enforceable solution. By requiring installers to capture and submit geo-tagged, time-stamped photos of the weigh-in procedure, and by assigning the Rater to review and verify those photos, the process becomes both documented and accountable. The result is: • A verifiable record of compliance when the Rater cannot physically attend • A path for Providers and oversight staff to confirm each step of the procedure post-installation • A workable solution that prevents unnecessary refrigerant recovery while preserving full compliance integrity This approach does not replace in-person Rater observation when it is feasible. Instead, it applies only in cases where the Rater's physical presence is impractical and the absence of such a pathway would otherwise result in incomplete or falsified documentation. In these situations, photo-verified weigh-in observation ensures actual compliance is achieved and verifiable, maintaining consumer protection and data integrity across the ECC framework.

Required Summary Element	Response
Data Needs	No additional data are required to evaluate or implement this measure. All components of the proposal build upon existing field verification procedures, Rater certification processes, and registry infrastructure. This measure simply formalizes and documents practices already inherent in the weigh-in verification process. Because it does not introduce a new performance metric or analytical standard, no new data collection or modeling are needed for evaluation.
Key Stakeholders	• ECC Raters and Rater Companies – responsible for reviewing and certifying photo-verified weigh-in documentation. • Energy Code Compliance Providers (ECC Providers) – responsible for registry validation, programming, and retention of verified photo records. • California Energy Commission – Standards Compliance Office (rulemaking and oversight). • Local Building Departments (AHJs) – recipients of verified compliance documentation for permit closure. • HVAC Contractors and Installers – responsible for completing the weigh-in procedure and providing photo documentation. • Homeowners and Building Owners – beneficiaries of verified, efficient, and compliant HVAC installations.
Estimated Energy Savings	This measure indirectly supports and safeguards the energy savings originally intended by the refrigerant charge verification requirement by ensuring that weigh-in procedures are not only documented, but also performed correctly and verifiably. Improper refrigerant charge is one of the most common causes of reduced HVAC efficiency and premature equipment failure. Under current conditions, when Raters cannot observe the weigh-in directly, there is limited assurance that the process was performed in accordance with manufacturer specifications or Energy Code requirements. By requiring geo-tagged, time-stamped photo evidence of each step — and by having both the Rater and Provider validate that evidence — this measure ensures that every weigh-in is performed and confirmed correctly. This results in stronger compliance with the Energy Code's refrigerant charge requirements, thereby sustaining the expected energy savings of properly charged systems statewide.
Estimated Costs	This measure imposes no new material or procedural costs on Raters, installers, or Providers. Smartphones capable of taking geo-tagged, time-stamped photos are already standard equipment. Because it provides an alternate verification pathway, it may actually reduce costs by minimizing repeat site visits when installers are not ready for weigh-in observation. Reducing the number of rescheduled visits lowers overall administrative and travel costs for Raters and Providers while improving workflow efficiency across the ECC program.

Required Summary Element	Response
Economic Impacts	The measure is administratively efficient and cost-neutral or better. It reduces the time and travel burden on Raters, helps installers avoid re-work, and provides homeowners with faster permit closure. By clarifying roles and verification methods, it improves accountability without adding overhead. Participation in this option would be voluntary. Each Provider may choose whether to implement and support the photo-verification pathway within their registry system. Providers that adopt this method can demonstrate technological leadership while maintaining alignment with Commission oversight requirements. For Providers that opt not to implement it, no change in procedure or cost occurs.
Consideration for Readiness (high, medium, or low)	Medium. This measure is feasible using existing technology and procedural frameworks. All necessary tools already exist in the field—smartphones, digital photo metadata, and established registry systems. Implementation would require: 1. Provider registry updates to automatically validate photo metadata, confirming that photos were taken at the correct project location and within a continuous time sequence. 2. Development of a verification form that includes a digital checklist within the Provider registry framework (covering both CF3R for single-family and LMCV for multifamily projects). This form would allow the Rater to upload and attach photos directly to each verification step and formally attest that the documentation has been reviewed and found acceptable. 3. Provider procedures to ensure consistent handling and retention of verified photo records. Providers may choose whether to support this option. Those that implement it can offer a technology-forward compliance enhancement that increases reliability and reduces delays in the weigh-in observation process, while Providers that do not implement it will continue following the existing RA3.2.3.2 verification model without impact.

Appendix B – CEC Comments

Alternate Verification of Weigh-In

David Choo – CHEERS

Direct Comments:

CEC is generally supportive of this proposal.

- This would be a large improvement if a solution could be identified such that all installers and raters could use the revised method consistently and reliably. A metadata-based protocol would rely on machine validation.
- For the 2025 update, the CASE team proposed live remote observation but only specified one proven technology.
- AB130 may prohibit this for 2028.
- How feasible would this be for a Rater to do all of this while conducting the test? How often is this test conducted/used? Is there really an impact if the procedure is changed? Need to think about additional cost if any.
- One of the nice things about this proposal is that photo and video verification was tried during COVID by AHJs, with varying degrees of success. We would need to consider how to avoid manipulation of the photo or video. This was considered during 2025 rulemaking so there has been some thought about it.
- It would be nice to have a simpler method, weigh-in is complex, and if this is really being considered we would need to look at it in detail starting with an in-field example.
- How do we coordinate this across providers? How would quality assurance be supported by the Provider? Is there a method that meets all the requirements and technical challenges in the market right now?
- AHJ feedback has indicated that many HVAC permits aren't finaled, and often because of the refrigerant charge verification at the time of year the change-out happens. So if this proposal could simplify that process and result in permit finals, that could be a benefit.