

# 1. Overview

This Manual explains the requirements for approval of residential *Alternative Calculation Methods* (ACMs or compliance software). Residential ACM compliance software are-is used to demonstrate compliance with the performance approach to the California Energy Efficiency Standards for Low-Rise Residential Buildings.

The approval procedure is one of self-testing and self-certification by the ACM compliance software vendor. The vendor conducts the specified tests, evaluates the results and certifies in writing that the ACM compliance software passes the tests. The California Energy Commission (Commission) will perform spot checks and may require additional tests to verify that the proposed ACM compliance software is suitable for compliance purposes. The vendor is required to develop a compliance supplement (program user manual) explaining how to use the program for showing compliance with the standards. The compliance supplement will also be checked by the Commission for accuracy and ease of use.

When energy analysis techniques are compared, there are two basic sources of discrepancies: differences in user interpretation when entering the building specifications, and differences in the ACM compliance software's algorithms for estimating energy use. The approval tests in this manual are designed to minimize differences in interpretation by providing explicit detailed descriptions of the test buildings that shall be analyzed.

This chapter presents the general requirements for residential ACM compliance software. Appropriate inputs for all modeling capabilities are discussed in Chapter 2. Chapter 3 has the rules for defining the *Standard Design*. Chapter 4 has algorithms and modeling assumptions used in the reference method. Chapters 5 and 6 have accuracy tests. Chapter 7 has requirements for field verification and diagnostic testing. Chapters 8 and 9 have requirements for ACM compliance software vendors.

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## 1.1 Minimum Modeling Capabilities

Minimum modeling capabilities shall be included in all ACM compliance software. If a candidate ACM compliance software does not have all of these capabilities, then it cannot be approved for compliance. The minimum modeling capabilities are summarized below:

- Conduction gains and losses through opaque and fenestration surfaces
- Slab edge gains and losses
- Infiltration gains and losses
- Solar gains through glazing including the effects of internal shading devices, external shading devices and fixed overhangs-
- Natural ventilation cooling ~~and natural ventilation for Indoor Air Quality (IAQ)-~~
- Mechanical Ventilation for Indoor Air Quality (IAQ)-
- Thermal mass effects to dampen temperature swings-
- Space conditioning equipment efficiency and distribution systems-
- Water heating equipment efficiency and distribution systems
- Building additions
- Unconditioned Zone Modeling (UZM)
  - Attic Model
  - Crawl Space
  - Radiant Barrier
  - Cool Roof

~~–Radiant Barriers~~

## •Cool Roofs

- Maximum Cooling Capacity

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## 1.2 Optional Modeling Capabilities

Candidate [ACMcompliance software](#) may have more capabilities than the minimum required. [CACMcompliance software](#) can be approved for use with none, a few, or all of the optional capabilities. The following optional capabilities are recognized for residential [ACMcompliance software](#):

- Raised floors with automatically operated crawl space vents-
- Zonal control or multi-zone modeling of the sleeping and living areas of the house-
- Attached sunspaces for collection and possible storage of heat for transfer to the main house-
- Exterior mass walls-
- [Overhangs and Side Fin Shading](#)-
- Combined hydronic space and water heating-
- Building [additionsalterations](#)-
- Solar water heating-
- ~~Form 3 report generator.~~
- Gas [fired and](#)- Absorption Cooling
- [Evaporatively cooled condensing units](#)
- [Ice storage air conditioner](#)

Many of the optional modeling capabilities have been previously approved by the Commission through the exceptional methods process. The approval tests for optional modeling capabilities are included in Chapter 6.

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## 1.3 Application Checklist

The following is a checklist of all the items that shall be included in an application package for [ACMcompliance software](#). Some materials are required only for general purpose [ACMcompliance software](#) and are so indicated.

- [ACMCompliance software Vendor Certification Statement](#). A statement from the [ACMcompliance software](#) vendor certifying the [ACMcompliance software](#), and, its reliability and accuracy when used for compliance purposes (see [Residential ACM Manual Appendix RA-2008](#)).
- [Computer Run Summary Sheets](#). Hard copy summary sheets of all the required computer runs (see [Residential ACM Manual Appendix RA-2008](#)).
- [Computer Runs](#). Copies of the computer runs specified in Chapters 5 and 6 of this Manual, including complete input and output files, on diskettes or in computer readable form acceptable to the Commission to enable spot checks.
- [Compliance Supplement](#). A copy of the Compliance Supplement discussed in Chapter 8. The Compliance Supplement and the [ACMCompliance software](#) User's Manual may be combined into the same document.
- [Copy of the ACMcompliance software](#). A [magnetic mediacomputer readable](#) copy of the [ACMcompliance software](#) (in a format agreed to by the Commission staff) for verification of analyses and random verification of compliance analyses. Weather data shall be included.

- *Application Fee.* An application fee of \$1,000.00 (one thousand dollars) is required to cover costs of evaluating the application.

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## 1.4 Types of Approval

This Manual addresses three types of [ACMcompliance software](#) approval: full approval, streamlined approval of new program features, and amendments to full approvals.

### 1.4.1 Full Approval

Full approval is required when a candidate [ACMcompliance software](#) has never been previously approved by the Commission, and/or when the [ACMcompliance software](#) vendor makes changes to the executable program code or algorithms, or any other change that in any way affects the results. The Commission may also require that all [ACMcompliance software](#) be approved again when the standards are updated on the three-year cycle or whenever substantial revisions are made to the approval process, for instance, if new analysis capabilities come into widespread use, and the Commission declares them to be minimum capabilities for all [ACMcompliance software](#).

When re-approval is necessary, the Commission will notify all [ACMcompliance software](#) vendors of the timetable for renewal. There will also be a revised [ACMcompliance software](#) Approval Manual published, with complete instructions for re-approval.

Full approval is required for all [ACMcompliance software](#) changes, unless they qualify for the streamlined approval process or for an addendum, as discussed below.

### 1.4.2 Streamlined Approval

Certain types of changes may be made to approved residential [ACMcompliance software](#) through a streamlined procedure. Examples of changes that qualify for streamlined approval are modifications to the user interface or implementation on a different operating system as long as there are no changes to the executable program code that would in anyway affect the results.

If an [ACMcompliance software](#) modification qualifies for streamlined approval, then the following procedure is followed:

- The [ACMcompliance software](#) vendor prepares an addendum to the compliance supplement, when appropriate, describing the change to the [ACMcompliance software](#).
- The [ACMcompliance software](#) vendor notifies the Commission by letter of the change. The letter shall describe in detail the nature of the change and why it is being made. The notification letter shall be included in the Compliance Supplement.
- Provide the Commission with an updated copy of the [ACMcompliance software](#) and include any new reports created by the [ACMcompliance software](#) (or modifications in the standard reports).
- The Commission responds in 45 days. The Commission response may take several forms. The Commission may request additional information, refuse to approve the change or require that the [ACMcompliance software](#) vendor make specific changes to either the Compliance Supplement addendum or the [ACMcompliance software](#).
- With Commission approval, the vendor may issue new copies of the [ACMcompliance software](#) with the Compliance Supplement addendum and notify [ACMcompliance software](#) users and building officials.

### 1.4.3 Amendments

[ACMcompliance software](#) approval shall be amended when optional modeling capabilities are added. The vendor shall provide the additional computer runs required for the optional modeling capability. It is not necessary to include computer runs previously submitted.

An amendment to ~~an~~ approved [ACMcompliance software](#) shall be accompanied by a cover letter explaining the type of amendment requested, and copies of other documents as necessary. All items on the application checklist should be submitted, when applicable. The timetable for approval of amendments is the same as for full approval.

#### 1.4.4 When Approval Is Not Required

Changes that do not affect compliance with the Energy Efficiency Standards for Residential Buildings do not require full or streamlined approval. However, the [ACMcompliance software](#) vendor shall notify the Commission and provide the Commission with an updated copy of the program and user manual. Re-approval is required for any [ACMcompliance software](#) program change that affects the energy use calculations for compliance, the modeling capabilities for compliance, the format and/or content of compliance forms, or any other change which would affect a building's compliance with the Standards. Any questions regarding applicable approval procedures should be directed to the Commission.

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### 1.5 Challenges

Building officials, program users, program vendors or other interested parties may challenge any residential [ACMcompliance software](#) approval. If any interested party believes that a compliance program, an algorithm, or method of calculation used in a compliance program, a particular capability or other aspect of a program provides inaccurate results, the party may challenge the program.

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### 1.6 Decertification of [ACMsCompliance Software](#)

The Commission may *decertify* (rescind approval of) an alternative calculation method through various means:

- All [ACMscompliance software](#) are decertified when the standards undergo substantial changes, which usually occurs every three years.
- Any [ACMcompliance software](#) can be decertified by a letter from the [ACMcompliance software](#) vendor requesting that a particular version (or versions) of the [ACMcompliance software](#) be decertified. The decertification request shall briefly describe the nature of the program errors or "bugs" which justify the need for decertification.
- Any "initiating party" may commence a procedure to decertify ~~an~~ [ACMcompliance software](#) according to the steps outlined below. The intent is to include a means whereby serious program errors, flawed numeric results, improper forms and/or incorrect program documentation not discovered in the certification process can be verified, and use of the particular [ACMcompliance software](#) version discontinued. In this process, there is ample opportunity for the Commission, the [ACMcompliance software](#) vendor and all interested parties to evaluate any alleged errors in the [ACMcompliance software](#) program.

**Process.** Following is a description of the process for challenging ~~an~~ [ACMcompliance software](#) or initiating a decertification procedure:

1. Any party may initiate a review of ~~an~~ [ACMcompliance software](#)'s approval by sending a written communication to the Commission's Executive Director. (The Commission may be the initiating party for this type of review by noticing the availability of the same information listed here.)

The initiating party shall:

- (a) State the name of the [ACMcompliance software](#) and the program version number(s) which contain the alleged errors;
- (b) Identify concisely the nature of the alleged errors in the [ACMcompliance software](#) which require review;
- (c) Explain why the alleged errors are serious enough in their effect on analyzing buildings for compliance to justify a decertification procedure; and,

- (d) Include appropriate data electronically (in a format agreed to by the Commission staff) and/or information sufficient to evaluate the alleged errors.
2. The Executive Director shall make a copy or copies of the initial written communication available to the [ACMcompliance software](#) vendor and interested parties within 30 days. [Comments from interested parties must be received within 60 days of the acceptance of the original application.](#)
  3. Within 75 days of receipt of the written communication, the Executive Director may request any additional information needed to evaluate the alleged [ACMcompliance software](#) errors from the party who initiated the decertification review process. If the additional information is incomplete, this procedure will be delayed until the initiating party submits complete information.
  4. Within 75 days of receipt of the initial written communication, the Executive Director may convene a workshop to gather additional information from the initiating party, the [ACMcompliance software](#) vendor and interested parties. All parties will have 15 days after the workshop to submit additional information regarding the alleged program errors.
  5. Within 90 days after the Executive Director receives the application or within 30 days after receipt of complete additional information requested of the initiating party, whichever is later, the Executive Director shall either:
    - (a) Determine that the [ACMcompliance software](#) need not be decertified; or,
    - (b) Submit to the Commission a written recommendation that the [ACMcompliance software](#) be decertified.
  6. The initial written communication, all other relevant written materials and the Executive Director's recommendation shall be placed on the consent calendar and considered at the next business meeting after submission of the recommendation. The matter may be removed from the consent calendar at the request of any person.
  7. If the Commission approves the [ACMcompliance software](#) decertification, it shall take effect 60 days later. During the first 30 days of the 60 day period, the Executive Director shall send out a Notice to Building Officials and Interested Parties announcing the decertification.

All initiating parties have the burden of proof to establish that the review of alleged [ACMcompliance software](#) errors should be granted. The decertification process may be terminated at any time by mutual written consent of the initiating party and the Executive Director.

As a practical matter, the [ACMcompliance software](#) vendor may use the 180 to 210-day period outlined here to update the [ACMcompliance software](#) program, get it re-approved by the Commission, and release a revised version that does not contain the bugs initially brought to the attention of the Commission. Sometimes the [ACMcompliance software](#) vendor may wish to be the initiating party to ensure that a faulty program version is taken off the market.

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### **1.7 Alternative [ACMCompliance Software](#) Tests**

This Manual provides tests to verify that [ACMcompliance software](#) are accurate. These tests are provided in Chapters 5 and 6 of the Manual. ~~An~~The [ACMcompliance software](#) vendor may propose alternate tests when the vendor believes that one or more of the standard tests are not appropriate for the [ACMcompliance software](#). Alternate tests will be evaluated by the Commission and will be accepted if they are considered reasonable. If accepted, the alternate test(s) will be added to this manual as an addendum and the alternate test(s) will be available for use by all [ACMcompliance software](#). The alternate test will coexist with the standard test presented in this Manual until the Manual is revised. When a new version of this Manual is produced, the alternative test may be substituted for the current test or may continue to coexist with the original test.

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## **1.8 Approval of New Exceptional Methods**

The Commission may approve new exceptional methods. Exceptional methods are special modeling capabilities or calculation methods necessary to recognize building features that cannot be adequately modeled with existing [ACMcompliance software](#). When an Exceptional Method is approved, a new optional capabilities test may be approved as part of the process. Exceptional Methods do not necessarily produce optional capabilities for [ACMcompliance software](#). For instance, radiant heating systems are recognized by an adjusted equipment efficiency that may be used directly in [ACMcompliance software](#) or other compliance methods. To be approved for the new optional capability, vendors shall amend their [ACMcompliance software approval](#).

Even if [anthe ACMcompliance software](#) already incorporates the Exceptional Method, the vendor shall receive approval to use the Exceptional Method in the compliance process. The [ACMcompliance software](#) vendor shall demonstrate that the [ACMcompliance software](#) automatically uses the correct fixed and restricted inputs for the Exceptional Method and that the standard reports identify the building feature(s) recognized by the Exceptional Method. Additionally, the ACM compliance supplement shall be updated, referencing the use of the new Exceptional Method.

To receive a copy of the Exceptional Method contact the Residential Office at (916) 654-4064.