
PROCEDURE: PRE-CHECK (PC) BUILDING DESIGNS CALGREEN/ENERGY CODE COMPLIANCE REVIEW

Division of the State Architect (DSA) documents referenced within this publication are available on the [DSA Forms](#) or [DSA Publications](#) webpages.

PURPOSE

This procedure outlines the requirements for the California Green Building Standards Code (CALGreen) and the California Energy Code (CEnC) compliance review of pre-check (PC) permanent modular or relocatable building designs submitted to DSA for approval. This procedure details how a building design, which will be placed on various sites, is required to meet the requirements of the current version of CALGreen and CEnC.

BACKGROUND

All public school facility construction within the State of California must comply with all parts of Title 24, California Building Standards Code, including the energy efficiency standards contained in Title 24, Part 6, CEnC and the mandatory measures contained in Title 24, Part 11, CALGreen.

SCOPE

This procedure is applicable to CALGreen and CEnC compliance for PC permanent or modular or relocatable building designs. See Procedure (PR) 07-01: *Pre-Check Approval* for general requirements for PC designs.

The applicant has the option to meet the CEnC using prescriptive or performance method.

Prescriptive Method

The prescriptive approach requires each component of the proposed building to meet a prescribed minimum efficiency. The approach offers little flexibility, but is easy to use, and may result in a faster review process. If the design fails to meet one requirement, then the project fails to comply with CEnC.

Performance Method

The performance approach allows greater flexibility than the prescriptive approach. It is based on an energy simulation model of the building. The performance approach requires an approved computer compliance program that models a proposed building, determines its allowed energy budget, calculates its energy use, and determines if it complies. Design options such as window orientation, glazing area, shading devices, thermal mass of building envelope, and zonal control are all considered in the performance approach. In addition to affording flexibility, the designer is able to choose building elements and systems that may result in the most cost-effective solution for compliance.

DEFINITIONS (*The following definitions apply to energy review of permanent and modular relocatable buildings.*)

Module

A repetitive building assembly.

Modular Building

A singular or repetitive number of modules which, when combined make up a conditioned or unconditioned building. Each modular building will have the exact same square footage and minimum energy features.

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1. PROCESS FOR REVIEW OF CALGREEN/ENERGY CODE COMPLIANCE

1.1 For intake review, the applicant shall submit documents electronically via DSA's standard project submittal process and concurrent with project submittal for other disciplines. Refer to *PR 18-04 Electronic Plan Review for Design Professionals*. Plan review for any discipline will not commence until all required information is provided. For energy review, A complete submittal for all projects, at a minimum, consists of:

- Signed and completed forms *DSA 403- Pre-Checked (PC) Prescriptive* or *DSA 403-Pre-checked (PC) Performance*, depending on the compliance path selected for the project.
- Construction documents incorporating all applicable information in Part 1, Part 2, and Part 3 of the applicable DSA 403-PC-PRE or DSA 403-PC-PER.
- Product manufacturer specifications for mechanical and electrical equipment and controls (cut sheets).
- Required certificates of compliance in a Portable Document Format (PDF).
- Energy features in the compliance reports must be specified on the plans. This includes all optional features.

Examples of features that must be included are, but not limited to:

- Typical Fenestration and Optional Fenestration – Specify: ID, Product Type, Frame Type, Size, U-factor, and SHGC
- HVAC systems
- HVAC controls
- Co2 sensors
- Insulation – Specify Location, Type, R-value, Depth
- Lighting systems
- Lighting controls
- The plans must include the make, model, and energy related values.
- Additional information is required for submittal by Section 1.2 below if the project demonstrates compliance to the CEnC under the Performance Method.

1.2 Project Compliance by Performance Method Required Documentation

- PDF copies of the applicable Building Energy Analysis Reports for each size modular building to demonstrate compliance, in accordance with the guidance in Section 4 below of this document shall be submitted with the application. For each size modular building upload all the reports by climate zone.
- The plans shall include 8 ½" x 11" full-size copies of the Building Energy Analysis Report (Certificate of Compliance NRCC-PRF-E) with the least energy efficient *orientation* for each size modular building. The "least compliance margin" is the least energy efficient orientation.
- Software files (Energy Runs) for the least efficient orientation for each size modular building must be uploaded with the application.
- Table of Performance Runs and Orientations.

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Energy performance runs shall address minimum compliance of the modeled building based on the following orientations: 30°, 75°, 120°, 165°, 210°, 255°, 300°, and 345°. For each climate zone in which the building may be sited, submit in a tabular form the compliance results of the performance runs indicating the orientation, the Time Dependent Value (TDV) of the standard design, the TDV of the proposed design, and the compliance margin the proposed design exceeds the energy efficiency of the standard design. (See Attachment 1 below.)

- **Run Codes (Calculation Date/Time):** Run codes identify the time when the energy report was calculated and is unique to each revision made to an energy model. The “calculation date/time” can be found on the California Energy Commission’s Certificate of Compliance NRCC-PRF-E. The run code on the least energy efficient Building Energy Analysis Report included in the drawings must match the run codes on the Table of Performance Runs and Orientations.

1.3 Fees

See Procedure (PR) 07-01: *Pre-Check (PC) Approval* for fee requirement.

1.4 Backcheck Submittal

At time of backcheck, a completed and revised set of construction documents shall be submitted. The final project submittal documentation shall reflect all updates to the information listed in Section 1.1 and 1.2 below if compliant by Performance Method of this document. All comments shall have an electronic plan review (EPR) response.

1.5 Revisions to the PC Design After Approval

No changes are permitted to the modular buildings that are less restrictive than that which has been demonstrated for CEnC compliance in the approved drawings. For site-specific application, if modifications to the modular building that affect CEnC compliance are desired, or if the manufacturer desires to revise the approved PC plans for all future submittals, the plans and revised certificates of compliance, including Building Energy Analysis Reports if applicable, must be submitted to DSA for approval under the original PC application number. While additional review by DSA may not be required, DSA reserves the right to thoroughly review of revised compliance documentation and require re-submission of deficient information prior to site-specific approval.

2. CALGREEN CODE COMPLIANCE REFERENCE MATERIAL

2.1 Title 24 Part 11 CALGreen Code

See Section 301.4 for mandatory measures for public schools and community colleges as adopted by DSA-Structural Safety (SS). Incorporate the mandatory measures for the project in the drawings and specifications as indicated on PART 3 of the forms DSA 403 PC-PER or DSA 403 PC-PRE.

2.2 Although not required for project submittal, the Guideline (GL) 4: *Project Submittal Guideline: CALGreen Code* may be used as a reference document for the requirements indicated as applicable on the forms DSA 403-PC-PER or DSA 403-PC-PRE.

3. ENERGY CODE COMPLIANCE REFERENCE MATERIAL

3.1 Title 24 Part 6 California Energy Code

Currently enforced version.

3.2 Nonresidential Compliance Manual

Produced by the California Energy Commission, current version.

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3.3 Reference Appendices

Joint Appendices and Nonresidential Appendices, including Nonresidential (NR) Appendix NA4 Compliance Procedures for Relocatable Public School Buildings current version produced by the California Energy Commission.

4. DEMONSTRATION OF ENERGY CODE COMPLIANCE

4.1 California Climate Zones

See Joint Appendix JA2, Table 2-1 California Standard Climate Zone Summary. The climate zone(s) for which the building has been designed shall be noted on the cover sheet of the construction documents. Use the cities in Table 2-1 for modeling the building.

Table 2-1 –California Standard Climate Zone Summary

Note: The alternative weather files modified for local design conditions use the specific latitude, longitude and elevation of the selected city.

Climate Zone	City	Latitude	Longitude	Elevation (ft)
1	Arcata	41.0	124.1	203
2	Santa Rosa	38.5	122.8	125
3	Oakland	37.7	122.2	6
4	San Jose-Reid	37.3	121.8	135
5	Santa Maria	34.9	120.4	253
6	Torrance	33.8	118.3	88
7	San Diego-Lindbergh	32.7	117.2	13
8	Fullerton	33.9	118.0	95
9	Burbank-Glendale	34.2	118.3	741
10	Riverside	33.9	117.4	840
11	Red Bluff	40.1	122.2	348
12	Sacramento	38.5	121.5	16
13	Fresno	36.8	119.7	335
14	Palmdale	34.6	118.0	2523
15	Palm Springs-Intl	33.8	116.5	475
16	Blue Canyon	39.2	120.7	5279

4.2 Performance Method

- Design for Specific California Climate Zones

For each size, the modular building with the least energy efficient orientation in California Climate Zones 1–16 shall be approved for placement only within the designed climate zone(s).

- All California Climate Zones: For each size, the modular building with the with the *least energy efficient orientation* in California Climate Zones 14, 15 and 16 is permitted to be built on any site in California.
- When differently sized modular buildings are grouped to form the building options in the project, the least energy efficient orientation respective to each modular building shall be used.

4.3 Prescriptive Method

- Design for Specific California Climate Zones: The modular building shall be designed to CEnC Section 140.3 and Table 140.3-B. Climate Zones that have the same criteria may be addressed as a group.

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- Design for All California Climate Zones: The modular building shall be designed to CEnC Section 140.3 and Table 140.3-D.

5. ENERGY CODE MODELING FOR MODULAR BUILDINGS WITH MULTIPLE OPTIONS (PERFORMANCE METHOD)

5.1 The following energy modeling guidelines will be used for each size modular building with multiple energy design options:

- Fenestration—Model the modular building envelope with the greatest area of windows, doors, and skylight openings.
- Roof assembly with variations for the roofing material: Model the roof assembly that will give the least compliance margin.
- Thermal envelope: Model the lowest insulation values that are allowed, this will result in the least compliant building.
- Variations in type of HVAC system—Model the HVAC system that will result in the least compliance margin. When alternative HVAC systems are offered one additional energy report at the worst-case orientation will be required for each optional HVAC system. Examples of alternative HVAC systems include but are not limited to:
 - When multiple modular buildings are combined, and multiple HVAC systems are combined resulting in fewer units but still have the same equivalent tonnage and fan power.
 - When different equipment manufacturers are used.
 - When different types (e.g., wall mounted, rooftop, split system) of HVAC systems are used.

6. EQUIPMENT SIZING

Equipment must be sized to meet the heating and cooling load of the building.

6.1 Performance Method

6.2 For each size modular building HVAC equipment must be sized to meet the Unmet Load Hours (UMLH) of 150 or less. For each modular building load calculations for the HVAC System shall be submitted for the worst case.

6.3 Prescriptive Method

Load calculations for proper equipment sizing per CEnC Section 140.4(b) shall be included on plans for approval. Equipment must be sized to meet the load per Section 140.4(a).

7. OUTDOOR VENTILATION REQUIREMENTS

Building Energy Analysis Reports shall be designed according to the following requirements for HVAC systems:

- For each size modular building, the outdoor air-ventilation rate and air-distribution assumptions made in the design of the ventilating system shall be listed on the drawings.

8. ACCEPTANCE TESTING

Include Acceptance Testing note on mechanical and electrical plan or cover sheet:

The California CEnC Section 10-103 requires Acceptance Testing on all newly installed lighting controls, mechanical systems, envelopes, solar, and process equipment after installation and

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before project completion. An Acceptance Test is a functional performance test to help ensure that newly installed equipment is operating and in compliance with the CEnC.

Lighting controls acceptance tests must be performed by a certified lighting controls Acceptance Test Technician (ATT).

Mechanical system acceptance tests must be performed by a certified mechanical ATT for projects submitted on or after October 1, 2021.

Envelope and process equipment acceptance tests shall be performed by the installing contractor, engineer/architect of record or the owner's agent.

A listing of certified ATT's can be found on the California Energy Commission's [Acceptance Test Technician Certification Providers](#) webpage.

The Acceptance Testing procedures must be repeated and deficiencies must be corrected by the builder or installing contractor until the construction/installation of the specified systems conform and pass the required acceptance criteria.

Project inspectors will be collecting the forms to confirm that the required Acceptance Tests have been completed.

The list of required Acceptance Tests is found under *DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE* in the last pages of the energy compliance report.

9. SOLAR AND BATTERY REQUIREMENTS

Refer to Title 24, Part 6, Section 110.10. and 140.10 for all energy related solar and battery requirements. All PV systems shall also comply with DSA IR 16-8, CBC section 3111, as well as California Fire Code Sections 1206 and 1207.

9.1 All projects must meet the requirements of CEnC 110.10 Mandatory Requirements for Solar Readiness, unless buildings meet exceptions found in 110.10(b)1B.

9.2 All PC projects must submit form NRCC-SAB-E.

9.3 When PV is required or optionally installed, each PC configuration shall have a PV system clearly delineated on the plans. The design documents shall include adequate notes and details, including a listing of power output of the PV system for each configuration and shall be located on the options page.

9.4 When modular buildings are combined into a singular configuration, designers may use either the performance or prescriptive method to size PV and battery systems. These sizes must be shown in a table to indicate the PV and battery system size required for each configuration.

9.5 For relocatable building approval PV power requirements shall be placed on all relocatable building labels. These sizes shall be shown in a table to indicate each configurations required PV and battery system size. See Interpretation Regulations (*IR*) 16-1: *Design and Construction Requirements for Relocatable Buildings and Modular Elevator Towers: 2019 CBC* Section 4.1.1.

9.6 Operating and maintenance information to be provided by building manufacturer

The following note shall be provided on the cover sheet of the plans:

- "Building manufacturer or Contractor shall leave for the building owner at occupancy operating information for all applicable mechanical and electrical features, materials, components, and devices installed in the building related to efficient energy use. In addition, the building manufacturer shall leave maintenance information for all features, materials, components, and manufactured devices that require routine maintenance for

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efficient operation of mechanical equipment and lighting systems.”

ATTACHMENT 1: SAMPLE PERFORMANCE RUNS AND ORIENTATION TABLE

For each size modular building, provide the compliance margins for all orientations and **highlight the least compliance margin** for each climate zone for easy reference. This table must be created by the designer and is not generated by the energy compliance software.

****If there are identical compliance margins, select one.***

PC DESIGN REVIEW INFORMATION Title 24, Part 6, Energy Code DSA Application #: Calculation Date/Time of Energy Report: Model Name and Option: Total Floor Area: HVAC System Type:						
Climate Zone 14 Palmdale						
Azimuth (Front Orientation)		Standard Design	Proposed Design	Margin	Margin %	Worst Case
30°	TDV-E					
	TDV-T					
	SOURCE					
75°	TDV-E					
	TDV-T					
	SOURCE					
120°	TDV-E					
	TDV-T					
	SOURCE					
165°	TDV-E					
	TDV-T					
	SOURCE					
210°	TDV-E					
	TDV-T					
	SOURCE					
255°	TDV-E					
	TDV-T					
	SOURCE					
300°	TDV-E					
	TDV-T					
	SOURCE					
345°	TDV-E					
	TDV-T					
	SOURCE					
15 Palm Springs						
Azimuth (Front Orientation)		Standard Design	Proposed Design	Margin	Margin %	Worst Case
30°	TDV-E					
	TDV-T					

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	SOURCE					
75°	TDV-E					
	TDV-T					
	SOURCE					
120°	TDV-E					
	TDV-T					
	SOURCE					
165°	TDV-E					
	TDV-T					
	SOURCE					
210°	TDV-E					
	TDV-T					
	SOURCE					
255°	TDV-E					
	TDV-T					
300°	TDV-E					
	TDV-T					
	SOURCE					
345°	TDV-E					
	TDV-T					
	SOURCE					
16 Blue Canyon						
Azimuth (Front Orientation)		Standard Design	Proposed Design	Margin	Margin %	Worst Case
30°	TDV-E					
	TDV-T					
	SOURCE					
75°	TDV-E					
	TDV-T					
	SOURCE					
120°	TDV-E					
	TDV-T					
	SOURCE					
165°	TDV-E					
	TDV-T					
	SOURCE					
210°	TDV-E					
	TDV-T					
	SOURCE					
255°	TDV-E					
	TDV-T					
300°	TDV-E					
	TDV-T					
	SOURCE					
345°	TDV-E					
	TDV-T					
	SOURCE					

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PC DESIGN REVIEW INFORMATION									
Title 24, Part 6, Energy Code									
DSA Application #:									
Calculation Date/Time of Energy Report:									
Model Name and Option:									
Total Floor Area:									
HVAC System Type:									
Climat e Zone	TDV-E Standar d Design	TDV-E Propose d Design	Margi n	TDV-E Standar d Design	TDV-E Propose d Design	Margi n	TDV-E Standar d Design	TDV-E Propose d Design	Margi n

A DSA Procedure documents a process or series of steps that DSA staff and/or external stakeholders must complete in order to fulfill one or more administrative requirements of DSA's review and approval of plans and specifications and construction oversight programs.