

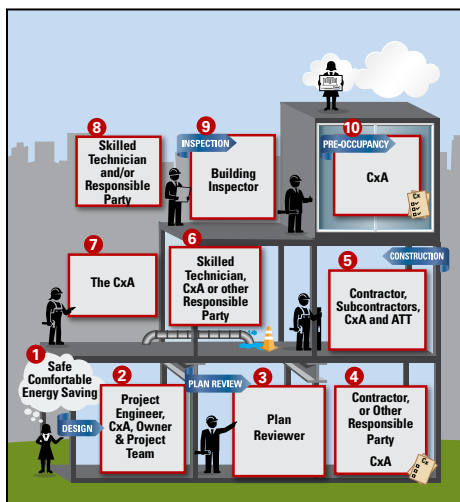
# What is Commissioning?

California's Building Energy Efficiency Standards (Energy Code or Title 24, Part 6), Title 24, Part 6 defines commissioning as "a systematic quality assurance process that spans the entire design and construction process, including verifying and documenting that building systems and components are planned, designed, installed, tested, operated and maintained to meet the owner's project requirements."

Closely related to acceptance testing, commissioning (also commonly referred to as Cx) involves functional testing during construction, but also includes activities during design that will ensure the building systems and associated controls will meet the owner's energy and operating efficiency goals.

Commissioning requirements for all newly constructed nonresidential buildings are included in the 2019 Energy Code. Many of these requirements were moved from Title 24, Part 11 (CALGreen, where commissioning was originally incorporated in California's 2008 building code), with the exception of healthcare facilities, which must comply with Title 24, Part 1.

**Why?:** Commissioning is critical to realizing the energy savings during building operation that were intended by the building design.



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## Relevant Code Sections

2019 California Building Energy Efficiency Standards, Title 24, Part 6:

- [Section 120.8](#) – Nonresidential Building Commissioning
- [Nonresidential Compliance Manual, Chapter 12](#) – Building Commissioning Guide
- [Nonresidential Compliance Manual, Chapter 13](#) – Acceptance Test Requirements
- [Nonresidential Reference Appendix 7 \(NA7\)](#) – Installation and Acceptance Requirements for Nonresidential Buildings and Covered Processes

## Relevant Compliance Forms

- [NRCC-CXR-E](#): Nonresidential Building Commissioning

# Roles and Responsibilities

Because commissioning spans the entire building delivery process from pre-design through occupancy, many parties are involved, making communication and coordination paramount. Understanding and assigning roles early in the commissioning process is key to success.

Below is a list of who may need to participate in the commissioning process.

- Owner, owner's representative or facility operator
- Designers (architect and MEP)
- Design Reviewer
- Plans Examiner
- General Contractor\*
- Key Subcontractors (HVAC, controls, TAB, etc.)\*
- Acceptance Test Technician (ATT)\*
- Commissioning Authority (CxA)\*
- Building Inspector\*

\* These parties are generally only involved in the commissioning process for buildings with nonresidential conditioned floor area 10,000ft<sup>2</sup> or greater when [§120.8\(f\)](#)- [§120.8\(i\)](#) are required.



The most appropriate person to fill each of these roles depends on the experience and expertise of the project team. The Energy Code does not specify who must function as the Commissioning Authority. However, there are restrictions on who may act as the Design Reviewer.

Building Size	< 10,000 ft <sup>2</sup>	10,000 - 50,000 ft <sup>2</sup>	> 50,000ft <sup>2</sup>	Complex systems in Bldgs > 10,000 ft <sup>2</sup>
Allowed Design Reviewer	A licensed professional engineer, architect or contractor, including the engineer or architect of record	A qualified engineer or architect in-house to the design firm but not associated with the project, a third-party engineer, architect, or contractor	A third-party engineer, architect or contractor	A third-party engineer, architect or contractor

Table 1. Design Reviewer Specifications, per §120.8(d) (references §10-103(a)1 in Title 24, Part 1)

## Commissioning Requirements

Commissioning requirements are included in Section 120.8 of the Energy Code and apply to newly constructed nonresidential buildings except healthcare facilities. Healthcare facilities shall instead comply with the applicable requirements of Chapter 7 of the California Administrative Code (Title 24, Part 1). Mixed use, such as motel/motel and high-rise residential projects that have nonresidential spaces, trigger commissioning requirements. These requirements apply to systems serving the nonresidential portions of the building. Areas that are intended for use by residents of the dwelling units (i.e. lobby, gym, laundry room, and other common areas) are not subject to meeting the commissioning requirements. However, a building department may choose to classify the building as mixed occupancy with these areas designated as nonresidential occupancies, in which case commissioning would apply to these areas.

Table 2 illustrates which requirements apply based on conditioned floor area.

Commissioning Requirements	Conditioned Floor Area		When
	< 10k ft <sup>2</sup>	≥ 10k ft <sup>2</sup>	
Owner's Project Requirements (OPR ) (§120.8(b))		X	Pre-Design
Basis of Design (BOD) (§120.8(c))		X	Draft during Schematic Design, update as necessary
Design Review (§120.8(d))	X	X	Preliminary at 50% Design / Final at 90% Design
Commissioning specifications in Construction Docs (CD) (§120.8(e))	X	X	Draft at 50% Design / Final at 90% Design
Commissioning Plan (§120.8(f))		X	Draft at 90% Design / Final during Construction
Functional Performance Tests (§120.8(g))		X	Construction
Operation & Maintenance (O&M) Training (§120.8(h))		X	Occupancy
Commissioning Report (§120.8(i))		X	Draft during Construction / Final during Occupancy

Table 2. Commissioning Requirements in Title 24, Part 6



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### Don't Forget About CALGreen!

Title 24, Part 11 (CALGreen) also includes requirements for commissioning in Chapter 5 - Nonresidential Mandatory Measures. These requirements are complementary to the Energy Code requirements, but be sure to read through them as additional systems such as renewable energy, landscape irrigation and water reuse systems are covered here.

# Functional Performance Test Procedures

Per [Section 120.8\(g\)](#), functional testing performed to satisfy commissioning requirements in nonresidential buildings (other than healthcare facilities) must be performed in accordance with acceptance testing procedures outlined in other sections of the Energy Code.

**Why?:** To demonstrate the correct installation and operation of each component, system and system-to-system interface.

Note that functional performance tests needed for commissioning are based on the systems documented in the Owner's Project Requirements (OPR) and Basis of Design (BOD) documents, and may be more comprehensive than the project's required acceptance tests. Not being included in the OPR/BOD does not exempt a system from acceptance test requirements outlined in other sections of the Energy Code.

## Forms: Which and When

### During Schematic Design:

- Tables F, G and H of [NRCC-CXR-E](#): Records that the requirement to hold a design review kickoff meeting between the owner, architect, design engineer and design reviewer has been met and that the OPR and BOD were reviewed during the meeting

**Why?:** The Energy Code dictates that the commissioning process starts in early design.

### At 90% Construction Documents:

- Table I: Construction Document Design Review Checklist of [NRCC-CXR-E](#): Records that applicable envelope, lighting/daylighting, water heating and general HVAC code elements are included and are well documented in the construction documents and that the required design review has been completed for the project
  - Completed by the Designer and the Design Reviewer

**Why?:** The Energy Code dictates that all the completed, signed certificates are to be made available with the building permit(s) issued for the building, and to the enforcement agency for all applicable inspections.

### Notes:

- All newly constructed nonresidential projects, other than healthcare facilities, are required to complete the design review certificates of compliance, regardless of project size (See Table 1).
- Although there are no commissioning forms other than the certificates of compliance, the [NRCA forms](#) (certificates of acceptance) are used to document functional performance tests for the inspector to review.

"Simple" HVAC Systems include:
(a) Unitary or packaged equipment listed in <a href="#">Tables 110.2-A, 110.2-B, 110.2-C and 110.2-E</a> that each serve one zone; <b>OR</b>
(b) Two-pipe, heating only systems serving one or more zones
"Complex" HVAC Systems include:
(a) Fan systems each serving multiple thermostatically controlled zones; <b>OR</b>
(b) Built-up air handler systems (non-unitary or non-packaged HVAC equipment); <b>OR</b>
(c) Hydronic or steam heating systems; <b>OR</b>
(d) Hydronic cooling systems

Figure 1. "Simple" vs. "Complex" HVAC Systems

# For More Information

## Commissioning Process

- Energy Code Section 120.8 – Nonresidential Building Commissioning  
[energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1208nonresidentialbuildingcommissioning.htm](http://energycodeace.com/site/custom/public/reference-ace-2019/Documents/section1208nonresidentialbuildingcommissioning.htm)
- Energy Design Resources e-news #96 (“Commissioning for Compliance”)  
[energydesignresources.com/resources/e-news/e-news-96-commissioning.aspx](http://energydesignresources.com/resources/e-news/e-news-96-commissioning.aspx)
  - Includes tips and tricks and a handy graphic that shows when during project delivery the commissioning requirements should be implemented.
- Energy Code Nonresidential Compliance Manual, Chapter 12 – Building Commissioning Guide  
[energycodeace.com/site/custom/public/reference-ace-2019/Documents/12buildingcommissioningguide.htm](http://energycodeace.com/site/custom/public/reference-ace-2019/Documents/12buildingcommissioningguide.htm)
  - Section 12.10 has detailed instructions on completing the compliance forms associated with commissioning

## Roles and Responsibilities

- Energy Code Nonresidential Compliance Manual, Chapter 12 – Building Commissioning Guide  
[energycodeace.com/site/custom/public/reference-ace-2019/Documents/12buildingcommissioningguide.htm](http://energycodeace.com/site/custom/public/reference-ace-2019/Documents/12buildingcommissioningguide.htm)
  - Section 12.1 of this guide outlines roles and information on how to find a qualified Commissioning Authority
- California Commissioning Collaborative  
[cacx.org/resources/provider\\_list.php](http://cacx.org/resources/provider_list.php)
  - Provider List that may be valuable when searching for a Commissioning Authority
- Title 24, Part 1, Section 10-103(a)1 – Permit, Certificate, Informational, and Enforcement Requirements for Designers, Installers, Builders, Manufacturers, and Suppliers  
[energycodeace.com/site/custom/public/reference-ace-2019/index.html#!Documents/10103permitcertificateinformationalandenforcementrequirementsfor.htm](http://energycodeace.com/site/custom/public/reference-ace-2019/index.html#!Documents/10103permitcertificateinformationalandenforcementrequirementsfor.htm)
  - Specifies who can act as the Design Reviewer
- California Energy Commission's Acceptance Test Technician Certification Provider webpage  
[www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/online-resource-center/acceptance](http://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/online-resource-center/acceptance)
  - For information on becoming a certified ATT

## Functional Performance Testing Requirements

- Energy Code Nonresidential Compliance Manual, Chapter 13 – Acceptance Test Requirements  
[energycodeace.com/site/custom/public/reference-ace-2019/Documents/13acceptancetestrequirements.htm](http://energycodeace.com/site/custom/public/reference-ace-2019/Documents/13acceptancetestrequirements.htm)
  - An overview of acceptance testing requirements, the process and the forms are further detailed in Chapter 13
- Energy Code Nonresidential Reference Appendix 7 (NA7) – Installation and Acceptance Requirements for Nonresidential Buildings and Covered Processes  
[energycodeace.com/site/custom/public/reference-ace-2019/Documents/appendixna7installationandacceptancerequirementsfornonresidential.htm](http://energycodeace.com/site/custom/public/reference-ace-2019/Documents/appendixna7installationandacceptancerequirementsfornonresidential.htm)
  - This Section of the Nonresidential Appendices includes test procedures, roles and responsibilities and other details related to acceptance testing

## Compliance Forms

- Nonresidential Compliance Forms  
[energycodeace.com/NonresidentialForms/2019](http://energycodeace.com/NonresidentialForms/2019)
  - NRCA Forms
    - The certificates of acceptance themselves are useful to understand required documentation
  - NRCC Forms
    - useful to understand required documentation

## California Energy Commission Information & Services

- Energy Code Hotline: 1-800-772-3300 (Free) or [Title24@energy.ca.gov](mailto:Title24@energy.ca.gov)
- Online Resource Center  
[www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/online-resource-center](http://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/online-resource-center)
  - The Energy Commission's main web portal for the Energy Code, including information, documents and historical information

## Additional Resources

- Energy Code Ace  
[EnergyCodeAce.com](http://EnergyCodeAce.com)
  - An online “one-stop-shop” providing free resources and training to help appliance and building industry professionals decode and comply with Title 24, Part 6 and Title 20. The site is administered by California's investor-owned utilities.

Please register with the site and select an industry role for your profile in order to receive messages about all our free offerings!



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