

Seattle Permits

— part of a multi-departmental City of Seattle series on getting a permit

Commissioning Requirements in the Seattle Energy Code “Commercial Building” Provisions

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What is Commissioning?

Commissioning is a systematic process of verification and documentation to ensure the building owner's design intent and operational requirements are delivered. Commissioning also ensures the building's energy consuming systems meet Seattle Energy Code requirements.

Seattle Energy Code Section C408

Our commissioning requirements are located in Section C408 of the 2018 Seattle Energy Code “Commercial Buildings” portion. This part of the code applies to multifamily buildings taller than three stories and to all non-residential buildings. (There are no commissioning requirements in the “Residential Buildings” portion of the energy code, which is applicable to single-family houses and to multifamily buildings up to three stories in height.)

When is Commissioning Required?

The 2018 Seattle Energy Code requires commissioning in four separate categories for “Commercial Buildings” where the system sizes in those buildings surpass the thresholds below. Some buildings will need commissioning for only one or two categories.

- **HVAC and refrigeration:** All HVAC systems with over 240 kBTU/h cooling or over 300 kBTU/h heating, plus all walk-in coolers and freezers (other than self-contained units) and all refrigerated warehouse coolers and freezers.

- **Lighting and receptacle controls:** Lighting and controlled receptacles in projects with at least 20 kW installed lighting overall, or more than 10 kW installed lighting with daylight or occupancy controls.
- **Water heating:** 200 kBTU/h capacity.
- **Metering:** All metering systems required by Section C409.
- **C406 and C407 requirements:** Any of the above systems that are required by Sections C406 (additional efficiency options) or C407 (Total Building Performance path).

What is SDCI's Commissioning Process?

You must provide all commissioning documentation to the owner, and copy certain documentation to the code official where required by code. The code official checks to be sure that the construction documents require commissioning. You must complete the commissioning report before we issue a final certificate of occupancy. The report will be reviewed by the code official to verify compliance with our code requirements.

Submittal of Commissioning Documents

1. Include basic information for the Commissioning Plan with your permit submittal, including:
 - Narrative description of your commissioning proposal
 - Commissioning team roles and responsibilities
 - Schedule of commissioning activities
 - In-house commissioning disclosure form (if applicable)See also “Required Drawing Text” on page 4 for the required notation.
2. Submit detailed information for the Commissioning Plan to SDCI before the first mechanical inspection (or first electrical inspection, if no mechanical), including:
 - List of equipment and systems to be commissioned
 - Functions to be tested



- Required test conditions
 - Performance criteria
3. Submit the following to SDCI before we issue the Certificate of Occupancy:
 - Completed and signed Commissioning Checklist (see page 6)
 - Commissioning Report – see Section C408.1.3
 4. Deliver the following to the owner before SDCI issues the Certificate of Occupancy:
 - Operating and maintenance manuals – See Section C103.6.2
 5. Deliver the following to the owner within 90 days after the Certificate of Occupancy is granted:
 - Record documents – See Section C103.6.1

Who Can be a “Certified Commissioning Professional”?

The Certified Commissioning Professional must be one of the following:

- An ASHRAE Commissioning Process Management Professional
- A Building Commissioning Certification Board (BCCB) Certified Commissioning Professional

Can a Design or Construction Firm Commission Its Own Projects?

Yes. However, when the commissioning is not done by an independent third-party, you must submit an “In-House Commissioning Disclosure and Conflict Management Plan.” Submit this plan to SDCI with the original contract documents and send copies to the owner. The plan contains two main elements:

- Discloses the relationship between the Certified Commissioning Professional and the other design and construction team members
- Provides a conflict management plan that clarifies how the Certified Commissioning Professional will remain independent and able to objectively inform the owner of any issues uncovered during the commissioning process

What Are the Requirements for the “Commissioning Report”?

The commissioning report must be submitted to SDCI before we issue the Certificate of Occupancy. The report must contain the following information:

- Test results
- Deficiencies noted and corrections made
- Test procedures and criteria
- List of deferred tests, and climatic conditions required to perform them
- List of unresolved deficiencies
- Commissioning Permit

What Systems Must Be Commissioned? HVAC and Refrigeration Commissioning

We require HVAC system commissioning for all:

- HVAC systems that have cooling capacity greater than 240 kBTU/h
- HVAC systems that have heating capacity greater than 300 kBTU/h
- Walk-in coolers and freezers
- Refrigerated warehouse coolers and freezers

Lighting and Controlled Receptacle Functional Testing

You need to conduct functional testing for lighting control hardware and software. The exception is if the lighting system for the whole project is smaller than 20 kW overall and less than 10 kW is controlled by daylight or occupancy sensors. The contract documents must state who will do this testing. At least the following must be tested:

- Occupancy sensors for lighting and controlled receptacles
- Time switches and programmable schedule controls for lighting and controlled receptacles
- Local override switches for lighting and controlled receptacles
- Daylight controls for lighting

Water Heating and Pool / Spa Commissioning

We require commissioning for water heating systems larger than 200,000 BTUH heating capacity and for all permanently installed pools and spas. Commissioning must include:

- Water heating equipment
- Water heating controls
- Pool and spa controls

Metering Commissioning

You need commissioning for all metering systems required by Section C409. Generally, this includes new buildings with more than 20,000 square feet of conditioned space, plus certain building alterations. Functional testing must include at least the following:

- High and low load conditions
- Compatible data formats
- Energy display (which can be a web page) showing:
 - Required information graphically
 - Current energy use rate for each source and submetering category
 - Total and maximum hourly values for any day, week, month or year.

What Are the Commissioning Requirements for Alterations to Existing Buildings?

We require commissioning for any alteration to a building system in an existing building, where the altered system exceeds the thresholds established in Section C408. As examples, if a boiler with a heating capacity greater than 200,000 kBtu/h were replaced, or if light fixtures with a total wattage greater than 20 kW were replaced, then you would need commissioning for that system.

Background Information on Commissioning Benefits of Commissioning

While the Energy Code specifies that equipment and systems must meet certain minimum requirements, the buildings don't always achieve the expected energy efficiency and energy savings. The reasons vary: defective equipment, poor design, improperly installed systems, or shoddy balancing. The problem can also be a lack of information for owners and maintenance staff to operate and maintain the equipment and systems correctly. Typically, a multitude of factors contribute to the problems and failures encountered on a project, and many are easily fixed once discovered.

The benefits of commissioning and completion include a reduction in service callbacks, tenant complaints, energy costs, and equipment replacement. Placing commissioning requirements in the code carries an additional set

of benefits serving the interests of owners, contractors, utilities, architects, and engineers. Commissioning raises the bar on efficient design, improves the quality of installation, and verifies that the systems operate effectively and as designed. Design professionals and contractors who perform high-quality work appreciate the level playing field brought about by the code requirements for completion and commissioning. Contractors who rely on cutting corners to win low bid jobs learn they cannot make a profit when they are held accountable for such shortcuts. As a result, reputable contractors are more cost-competitive and are awarded more contracts. A higher overall standard of work is produced benefiting everyone involved.

With improved efficiency, buildings consume less power and water. As a result, the electric, gas, and water utilities are able to meet a greater portion of consumer demand from their own resources without needing to buy additional resources from other operators. Efficiently operating buildings save money by reducing the cost of HVAC operations and lighting. You can save a surprising amount of electricity with a well commissioned lighting system. You can also minimize water use when you have properly selected and adjusted cooling towers, and boiler blowdown is set effectively. The owner's interests are protected through the commissioning process, so that the owner actually gets the expected results. Commissioning works the "bugs" out of the system.

Administrative Issues in the Commissioning Process

Commissioning should NOT be a process that starts after the building is constructed and systems are installed. For the most successful commissioning, the Certified Commissioning Professional should be involved as early in the process as possible, ideally prior to design. The commissioning process needs to include all the important participants, and the controls contractor is a key player. For a smooth process, the Certified Commissioning Professional's responsibilities should be clearly spelled out.

Separate Seattle Fire Department Requirements: "Acceptance Testing" of Life Safety Systems

Seattle Fire Department requires "acceptance testing" of life safety systems. Proof of proper operation of the smoke control/exhaust system is subject to Seattle Fire Department approval before occupancy. To obtain Fire Department approval, you shall submit a report prepared in accordance with Seattle Building Code section 909.18.8.3, to the Fire Department. An independent certified third party must individually test smoke control devices, equipment, components and sequences. Information on certification can be found in Administrative Rule 9.01.15 on the

Fire Department’s website at <http://www.seattle.gov/fire/business-services/fire-code-and-fire-safety-documents#administrativerules>. Your report shall certify that the system has been fully tested and meets the requirements of this rule. Fire Department approval will be required before SDCI will issue a certificate of occupancy.

Required Drawing Text

Commissioning Notation on Construction Documents

The completion and commissioning requirements of Section C408 in the Seattle Energy Code may entail a lengthy text insertion on the drawings, or a more succinct reference on the drawings to detailed text in the specifications. The drawings you submit with the permit application must, at a minimum, contain notes indicating that the project will comply with the Seattle Energy Code commissioning and completion requirements in Section C408.

Sample Commissioning Notes

The following sample drawing notes comply with our completion and commissioning requirements, although this format is not mandatory. When you place further detail in the specifications, a drawing note such as “See specifications for further commissioning requirements” may be warranted.

“Commissioning shall address all the features listed in Seattle Energy Code (SEC) Section C408. The commissioning plan shall comply with SEC Section C408.1.2.”

“Record drawings and an operating and maintenance manual shall be provided to the building owner per SEC Section C103.6.”

“A Commissioning Report of test procedures and results shall be prepared prior to issuance of a final certificate of occupancy per SEC Section C408.1.3. This report shall include a completed Commissioning Checklist.”

Mechanical and Refrigeration Commissioning and Completion Notation on Drawings

Your HVAC and refrigeration system commissioning notes should be placed on the first mechanical sheet. Your drawing notes should require commissioning and testing in accordance with Section C408.2.

Lighting and Receptacle Controls Functional Testing Notation on Drawings

Your lighting control functional testing notes should be placed on the first lighting sheet. Your drawing notes should require functional testing in accordance with Section C408.4, and must identify the party who will conduct that testing.

Service Water Heating Commissioning Notation on Drawings

Your water heating system commissioning notes should be placed on the first plumbing sheet. Your drawing notes should require commissioning and completion of service water heating systems in accordance with Section C408.3.

Commissioning Notation on Drawings for Metering Systems

Your metering system commissioning notes should be placed on the first electrical sheet or on the first sheet describing the metering section. Your drawing notes should require functional testing in accordance with Section C408.6.

For Further Information

Further information on Seattle Energy Code requirements is available online through SDCI’s Energy Code website at [http://www.seattle.gov/sdci/codes/codes-we-enforce-\(a-z\)/energy-code](http://www.seattle.gov/sdci/codes/codes-we-enforce-(a-z)/energy-code).

Resources

- The Building Commissioning Association provides a number of exceptionally useful documents for public use in the BCA Resources Center.

■ Resources | BCxA Building Commissioning Association

Two of these documents deserve special mention:

- New Construction Building Commissioning Best Practices. [New Construction Building Commissioning Best Practices | BCxA Building Commissioning Association](#)
- Existing Building Commissioning Best Practices. [Existing Building Commissioning Best Practices | BCxA Building Commissioning Association](#)

The Building Commissioning Handbook, 3rd Edition, is available for purchase through the BCA website, and is considered the fundamental text on the subject.

- ASHRAE Guideline 0-2019 is a fundamental technical document for the commissioning process, while Guideline 1.1-2007 specifically relates to HVAC commissioning
- The Whole Building Design Guide provides invaluable guidance in its Building Commissioning chapter, and

the Commissioning Definitions section is adapted from the ASHRAE Guideline.

- Building Commissioning | Whole Building Design Guide, www.wbdg.org/building-commissioning
- LEED Enhanced Commissioning requirements are specified here:
 - Enhanced commissioning | U.S. Green Building Council (www.usgbc.org/node/1733827)
- The National Environmental Balancing Bureau posts its guideline “Whole Building Systems Commissioning of New Construction” Fourth Edition (2009)
 - Procedural Standards for Whole Building Systems Commissioning... | NEBB www.nebb.org/assets/1/7/PST_BSC_2009.pdf
- Lawrence Berkeley National Labs publishes “Building Commissioning - A Golden Opportunity for Reducing Energy Costs and Greenhouse-Gas Emissions”
 - Building Commissioning - A Golden Opportunity for Reducing ... (<http://cx.lbl.gov/documents/2009-assessment/lbnl-cx-cost-benefit.pdf>)

Access to Information

Links to electronic versions of SDCI **Tips, codes, and forms** are available on the "Tools & Resources" page of our website at www.seattle.gov/sdci. Paper copies of these documents are available from our Public Resource Center, located on the 20th floor of Seattle Municipal Tower at 700 Fifth Ave. in downtown Seattle, (206) 684-8467.



**FIGURE C408.1.4.1
COMMISSIONING COMPLIANCE CHECKLIST**

Project Information	<p>Project Name:</p> <p>Project Address:</p> <p>Certified Commissioning Professional:</p> <p>Type of ISO Certification and Number:</p>
Supporting Documents	<p><input type="checkbox"/> Manuals, record documents and training have been completed (check box). If not scheduled, provide date for each item below: (Section C103.6)</p> <ul style="list-style-type: none"> • Building operations and maintenance information (C103.6.2) have been submitted to the owner or scheduled date: _____ • Manuals (C103.6.2.1) have been submitted to the owner or scheduled date: _____ • Compliance documentation (C103.6.3) has been provided to the owner or scheduled date: _____ • System operation training (C103.6.4) has been provided to the owner or scheduled date: _____
Commissioning Plan	<p><input type="checkbox"/> Commissioning Plan was used during construction (Section C408.1.2)</p>
Commissioning Report	<p><input type="checkbox"/> Commissioning Report has been submitted (Section C408.1.3)</p>
Commissioned Systems	<p><input type="checkbox"/> Mechanical Systems were included in the commissioning process (Section C408.2)</p> <p><input type="checkbox"/> Testing, adjusting, and balancing is complete (Section C408.2.2)</p> <p><input type="checkbox"/> There are unresolved deficiencies with the mechanical systems. These are described in the attached Commissioning Report submitted to the Owner.</p> <p><input type="checkbox"/> Service Water Heating Systems were included in the commissioning process (Section C408.3)</p> <p><input type="checkbox"/> There are unresolved deficiencies with the service water heating systems. These are described in the attached Commissioning Report submitted to the Owner.</p> <p><input type="checkbox"/> Controlled receptacles and lighting control systems were included in the commissioning process (Section C408.4)</p> <p><input type="checkbox"/> There are unresolved deficiencies with the electrical power and/or <i>automatic</i> lighting controls. These are described in the attached Commissioning Report submitted to the Owner.</p> <p><input type="checkbox"/> Additional systems were included in the commissioning process (Section C408.5)</p> <p><input type="checkbox"/> There are unresolved deficiencies with systems required by C406 or C407. These are described in the attached Commissioning Report submitted to the Owner.</p> <p><input type="checkbox"/> Metering systems were included in the commissioning process (Section C408.6)</p> <p><input type="checkbox"/> There are unresolved deficiencies with the metering system. These are described in the attached Commissioning Report submitted to the Owner.</p> <p><input type="checkbox"/> Refrigeration systems were included in the commissioning process (Section C408.7)</p> <p><input type="checkbox"/> There are unresolved deficiencies with systems required by Section C410. These are described in the attached Commissioning Report submitted to the Owner.</p>
Certification	<p><input type="checkbox"/> I hereby certify that requirements for Section C408 System Commissioning have been completed in accordance with the Washington State Energy Code, including all items above.</p> <p>Signature: _____ Date: _____</p> <p><input type="checkbox"/> I hereby certify that requirements for Section C408 System Commissioning have been completed in accordance with the Washington State Energy Code, including all items above.</p> <p>Signature: _____ Date: _____</p>