



How-to Guide: *Supporting Documentation*

In Compliance with 2016 New York City Energy Conservation Code

- GENERAL
- BUILDING ENVELOPE
- MECHANICAL SYSTEMS
- LIGHTING & ELECTRICAL POWER
- **OTHER REQUIREMENTS**

NOTE: In this *How-To Guide: Supporting Documentation*, selected Energy Code provisions have been generalized, summarized, rephrased, and/or highlighted. This guide is intended: 1) To provide general guidance for the job applications seeking compliance with the 2016 NYCECC; 2) Not to replace or represent the entire 2016 NYCECC and related regulations of the City of New York and the Department of Buildings; and 3) Not to provide complete compliance solutions for any particular type of job or work. Comprehensive mandates, applicability, exemptions, exceptions and options will be found in the 2016 NYCECC and related regulations of the City of New York and the Department of Buildings.

MANDATORY ADDITIONAL EFFICIENCY PACKAGE

(NYCECC-only* Requirements)

▪ Six Options

(must choose at least one)

- **New Commercial buildings that choose NYCECC* as Code compliance path** must demonstrate compliance with **at least one** of the following as an additionally required energy efficiency system: C406.1

- Option 1. **More Efficient HVAC Performance** C406.2

- Option 2. **Reduced Lighting Power Density** C406.3

- Option 3. **Enhanced Digital Lighting Controls** C406.4

- Option 4. **On-Site Supply of Renewable Energy** C406.5

- Option 5. **Provision of Dedicated Outdoor Air System (DOAS)** C406.6

- Option 6. **High Efficiency Service Water Heating** C406.7

- **New Tenant spaces that choose NYCECC* as Code compliance path** must demonstrate compliance with one of the following: C406.1.1
Option 1, Option 2, Option 3, Option 5, or Option 6. Alternatively, New Tenant spaces may demonstrate compliance with Option 4 where the entire building is in compliance with Option 4.

* Job applications that chose 'NYCECC' as the 'Code Compliance Path'—on PW1-Section 10, 'NYCECC' has been marked—must comply with the requirement of Additional Efficiency Package. In other words, job applications following ASHRAE are not subject to this requirement (Section C406).

MANDATORY ADDITIONAL EFFICIENCY PACKAGE

Option 1. More Efficient HVAC Performance

HVAC equipment schedules on construction drawings must clearly indicate that:

C406.2

- All proposed *Energy-Code-regulated equipment* exceed the minimum efficiency requirements listed in Tables C403.2.3(1) through C403.2.3(7), C403.2.3(11), and C403.2.3(12) *by 10%*, in addition to meeting the mandatory requirements of Section C403.
- *Equipment not listed* in Tables C403.2.3(1) through C403.2.3(7), C403.2.3(11), and C403.2.3(12) are *limited to maximum 10%* of the total building system capacity.

Option 2. Reduced Lighting Power Density

- Construction drawings must prove that the total interior lighting power (watts) of the building are determined by using:
 - 90% of the interior lighting power values specified in Table C405.4.2(1) times the floor area for the building types, **or**
 - 90% of the interior lighting power allowance calculated by the Space-by-Space Method in Section C405.4.2.2.

C406.3

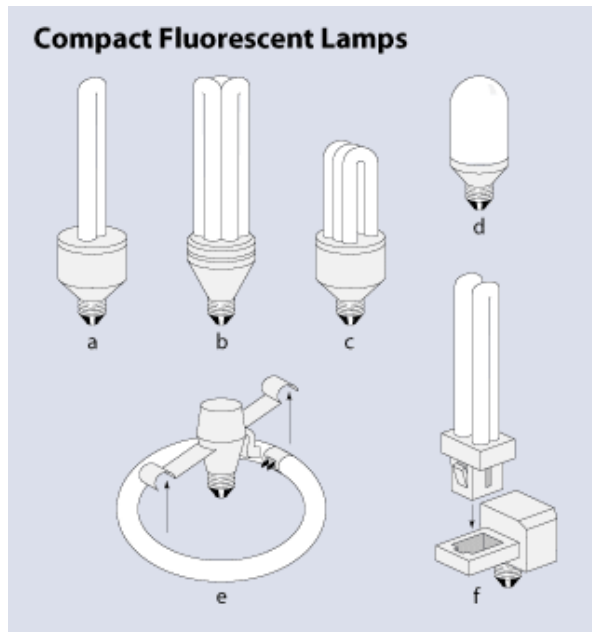


Figure OR-2. **Examples of High-Efficacy Lamps**
Source: energycodes.gov

MANDATORY ADDITIONAL EFFICIENCY PACKAGE

Option 3. Enhanced Digital Lighting Controls

- Construction drawings must specify that all of the interior lighting systems in the building have all of the *following enhanced lighting controls* and will be located, scheduled and operated in accordance with Section C405.2.2: C406.4
 - 1) Luminaires capable of continuous dimming,
 - 2) Luminaires capable of being addressed individually, or in a group of maximum 4 luminaires when individual addressability is technically unachievable,
 - 3) Maximum 8 luminaires controlled together in a Daylight zone,
 - 4) Fixtures controlled through a digital control system that include the following functions:
 - Control reconfiguration based on digital addressability
 - Load shedding
 - Individual user control of overhead general illumination in open offices
 - Occupancy sensors capable of being reconfigured through the digital control system,
 - 5) Construction documents specifying requirement for submittal of a Sequence of Operations, including specifications outlining each of the functions in Item 4) above, **and**
 - 6) Functional testing of lighting controls complying with Section C408.Lighting/Power plans, light fixture schedules, specification notes, controls narrative, etc.—all combined together must clearly identify the enhanced lighting controls.

Option 4. On-Site Supply of Renewable Energy

- Construction drawings must specify the proposed on-site renewable energy systems with sufficient system details to prove that the total minimum ratings of the systems must comply with one of the following: C406.5
 - 1) Provide minimum 0.5 watts/sf of conditioned floor area, **or**
 - 2) Provide minimum 3% of energy used within the building for building mechanical and service water heating equipment and lighting regulated in Chapter C4.



Figure OR-3. **Solar Photovoltaic: Sample On-Site Renewable Energy System**
Source: energy.gov/revolution-now
energycodes.gov/training

MANDATORY ADDITIONAL EFFICIENCY PACKAGE

Option 5. Provision of a Dedicated Outdoor Air System (DOAS) for Certain HVAC Equipment

- This option is applicable to building HVAC equipment system complying with Section **C403.4 Hydronic and multiple-zone HVAC systems controls and equipment.** C406.6
- For job applications electing this option, construction drawings must indicate that the building HVAC systems are equipped with an *independent ventilation system designed to provide 100% outdoor air* to each individual occupied space.
- Construction drawings also must specify that:
 - The ventilation system must have total energy recovery capacity.
 - The HVAC system must include supply-air temperature controls that automatically reset the supply-air temperature in response to representative building loads, or to outdoor air temperatures.
 - The controls must reset the supply-air temperature to a minimum 25% of the difference between the design supply-air temperature and the design room-air temperature.

Option 6. High Efficiency Service Water Heating

- This High Efficiency Service Water Heating (SWH) system option is applicable to the following *Occupancy Group* types only: C406.7
 - **Group R-1:** Boarding houses, hotel or motels
 - **Group R-2:** Buildings with residential occupancies
 - **Group A-2:** Restaurants and banquet halls or buildings containing food preparation areas
 - **Group A-3:** Health clubs and spas
 - **Group I-2:** Hospitals, psychiatric hospitals and nursing homes
 - **Group F:** Laundries

For a mixed-use building comprised of partial building areas of the above-listed occupancy, the SWH system serving *only* the building areas of such occupancies will be eligible for this option.
- The SWH equipment schedule must demonstrate *reduced energy use* in the SWH system by incorporating the following:
 - 1) Waste heat recovery from service hot water, heat-recovery chillers, building equipment, process equipment, or a combined heat and power system,
and/or
 - 2) Solar water-heating systems,
and

The incorporated systems as the above are sized to provide:

 - Minimum 60% of hot water requirements, **or**
 - 100% of hot water requirements if compliance with Section C403.4.5 is required.

PERMANENT CERTIFICATE – RESIDENTIAL BUILDINGS REQUIREMENT

For Residential building job applications, the builder or registered design professional must complete or update the Permanent Energy Efficiency Certificate, and have it installed prior to final inspections of the application.

Permanent Certificate Must List the Following at a Minimum

- Predominant R-values of insulation installed in or on ceiling/roof, walls, foundation, and ducts outside the envelope
- U-factors/SHGC values of fenestration
- Air leakage testing results
- Types and efficiencies of HVAC and Service water heating equipment
- Location of the Solar-Ready zone and pathways to the electrical service panel or service hot water system

1 RCNY §5000-01(g)(5)
R401.3
RB103.8

Location of the Permanent Certificate

- Drawings must specify that the Certificate will be posted on a wall in the space where the furnace is located, a utility room or an approved location inside the building prior to final inspections of the application.
- When specifying to post the Certificate near or on the electrical distribution panel, drawings must also instruct that the Certificate must be readily visible (at eye level and in plain sight), and yet must not obstruct the visibility of the other Code-required labels (e.g., circuit directory label, service disconnect label, etc.).

Additions & Alterations Job Applications

For Additions and Alterations applications affecting information on the existing Permanent Certificate, drawings should specify that the existing Certificate must be updated and re-installed.

Permanent Energy Efficiency Certificate

Insulation Rating				
Ceiling/Roof	Attic	R-49 cavity		
	Vaulted	R-49 cavity		
Walls	Framed wall	R-5 continuous +	R-21 cavity	Wood frame
	Mass wall	n/a		
	Basement	R-10 continuous +	R-19 cavity	
	Crawl Space	n/a		
Floors	Over unconditioned space	R-30 cavity		
	Slab Edge	R-10 continuous	4ft deep	
Ducts outside	Attic	R-8		
Conditioned space	Other	R-6		
Fenestration Rating				
Window	NFRC U-Factor	U-0.27		NFRC SHGC 0.36
Opaque door		U-0.32		0.35
Skylight		U-0.5		0.36
Air Leakage Test Results				
Blower door	2.7	ACH/50Pascals	Duct testing	4.0 cfm/100ft ²
Equipment Performance				
Heating System	Gas-fueled Hot Water Boiler	140,000 Btu/h	Efficiency	91.4% AFUE
Cooling System	Split System Air Conditioner	54,000 Btu/h		16 SEER

Figure OR-5.a. Sample Permanent Energy Efficiency Certificate (partial view)
[Click [here](#) for the full certificate view]

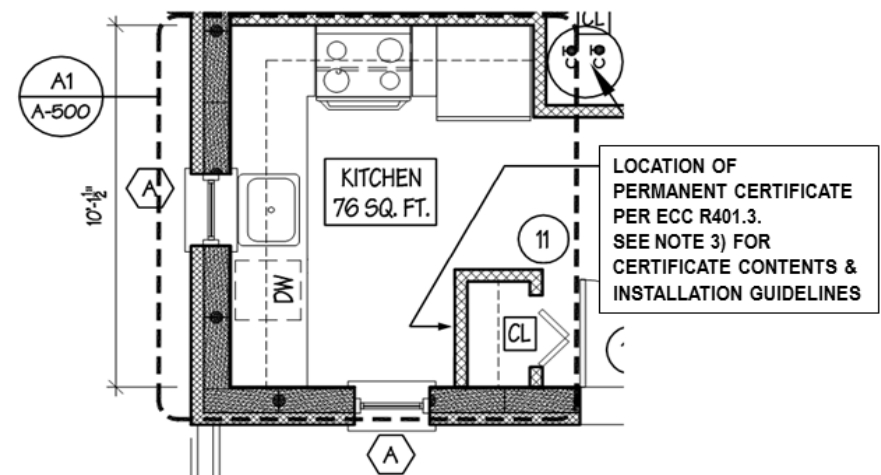


Figure OR-5.b. Sample Plan Drawing indicating Certificate Requirement

SOLAR READY – RESIDENTIAL BUILDINGS REQUIREMENT

■ Solar-Ready Zone – Definition

Section(s) of the roof or building overhang designated and reserved for the future installation of a solar photovoltaic or solar thermal system.

RB102

■ Solar-Ready Zone is Required for Residential Job Applications with Conditions as follows

- New detached one- and two-family dwellings, and multiple single-family dwellings (townhouses), and
- Area of the roof oriented between 110° and 270° of true north \geq 600sf, and
- The building is shaded \leq 50% of daylight hours/yr., and
- New residential building without a permanently installed on-site renewable energy system.

R401.4
RB103.1

■ Essential Requirements

When Solar-Ready Zone is required, drawings must specify:

- Minimum Solar-Ready Zone area: 1) 100 sf for townhouses \leq 2,000 sf of max. 3-stories above grade plane; 2) 200 sf for all others.
- The Solar-Ready Zone may be composed of multiple areas of min. 5' in width and min. 80 sf in area and these areas must be exclusive of access or set back areas as required by the New York City Fire Code.
- The main electrical service panel has a reserved space to allow installation of a dual pole circuit breaker for future solar electric installation and is labeled *For Future Solar Electric*.

RB103.3
RB103.7

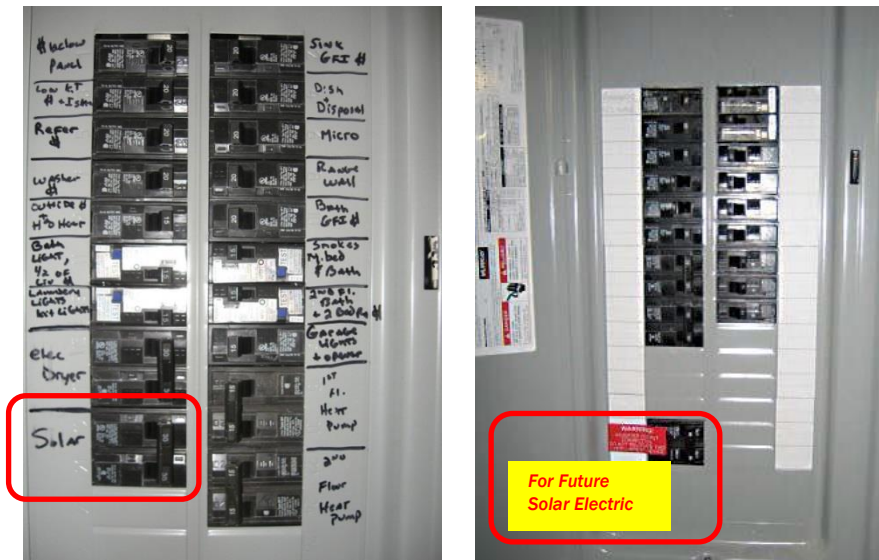


Figure OR-6.
Electrical service panel with dedicated breaker for future PV system
Source: basc.pnnl.gov/images

ENERGY RATING INDEX (ERI) – COMPLIANCE ALTERNATIVE FOR RESIDENTIAL BUILDINGS

ERI is a score-based rating system which alternatively determines Energy Code compliance of a new residential building based on its energy performance. It allows applicants to approach the Energy Code with the same flexibility of the Simulated Performance Alternative (Section R405), yet it uses energy modeling and in-field inspection to confirm that results are achieved.

ERI ‘Reference Design’ vs. ‘Rated Design’

The ERI *Reference Design*, representing ERI score of 100, means the building design meets the minimum requirements of the 2006 IECC. For *Rated Design* of a newly proposed residential building to demonstrate compliance with the 2016 NYCECC, the ERI analysis on the building must result in the **ERI score of 54 or less** (for Climate zone 4). A residential building that achieves the rated ERI score of 54 is 46% more energy efficient than the *Reference Design* building, which meets the 2006 IECC (ERI score of 100).

R406.3.1
R406.4

For Compliance Through ERI Approach, Drawings Must Indicate:

- 1) Mandatory provisions for Residential buildings (Section R401 thru Section R404) and Section R403.5.3 are met.
- 2) The building thermal envelope meets the 2011 NYCECC prescriptive requirements (Table 402.1.1 or Section 402.1.3).
- 3) Verification of compliance is required to be completed by an approved third party.
- 4) Documentation is required regarding: a) Compliance software tools, b) Compliance report, and c) Other additional documentation that may be required to submit to the Department.
- 5) Calculation software tools, where used, meet the requirements on: a) Minimum capabilities, b) Specific approval, and c) Input values.

R406.2
R406.5
R406.6
R406.7

- For job applications opting for this compliance path, on PW1-Section 10, ‘Energy Modeling (EN1)’ should be marked as Energy Analysis method.

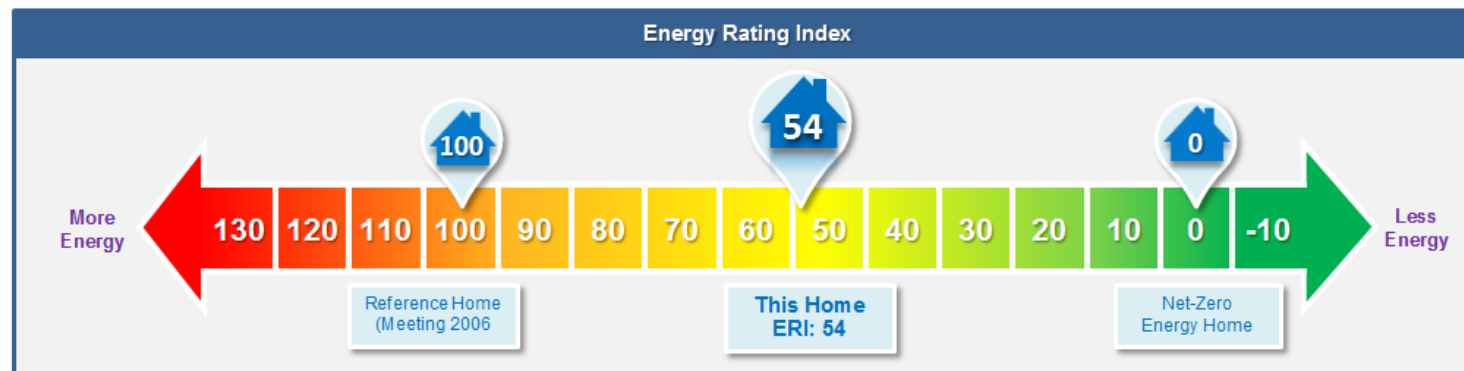


Figure OR-7. Sample Energy Rating Index Label

SYSTEM COMMISSIONING

■ Specify Total Proposed Heating and Cooling Capacity

- For ALL Commercial job applications – New buildings or Alterations, Multifamily or Commercial occupancy, **Total Heating Capacity** (in Btu/h) proposed by newly installed mechanical equipment, and **Total Cooling Capacity** (in Btu/h) proposed by newly installed mechanical equipment
Must be clearly calculated and documented on an EN- labeled sheet.
- In the ‘Total Heating Capacity’ calculations, the ‘Service Water Heating’ equipment capacity *must* also be included.

■ Specify Whether System Commissioning is Required

- For ALL job applications – New buildings or Alterations, Residential or Commercial Buildings – drawings (*on an EN-labeled sheet*) must clearly state *whether or not* System Commissioning is required.
- System Commissioning is *not required* for:
 - Mechanical Systems** of Total proposed Heating capacity < 600,000 Btu/h; *and*
Total proposed Cooling capacity < 480,000 Btu/h, *and*
 - Renewable Energy Systems** of Total generating capacity < 25 kW

1 RCNY §5000-01(g)(4)(iii)
C408.2
6.7.2.4

■ Areas Where Commissioning is Required

- For job applications with systems for which Commissioning is required, drawings should clearly identify specifications of each Commissioning-required system with detailed information on the equipment/fixture schedules and complete narratives including controls notes.
- Commissioning-required systems, at a minimum, include the following:
 - Mechanical Systems
 - 1) Heating, cooling, air handling and distribution, ventilation and exhaust systems;
 - 2) Energy recovery systems;
 - 3) Manual or automatic controls;
 - 4) Plumbing systems;
 - 5) Service water heating systems;
 - 6) Refrigeration systems;
 - 7) Renewable energy and energy storage systems; and
 - 8) Other systems/equipment/components supporting HVAC and affecting energy use.

C408.2
C408.3.1

Lighting Control Systems

- 1) Occupant sensor controls;
- 2) Time-switch controls; and
- 3) Daylight responsive controls.

SYSTEM COMMISSIONING

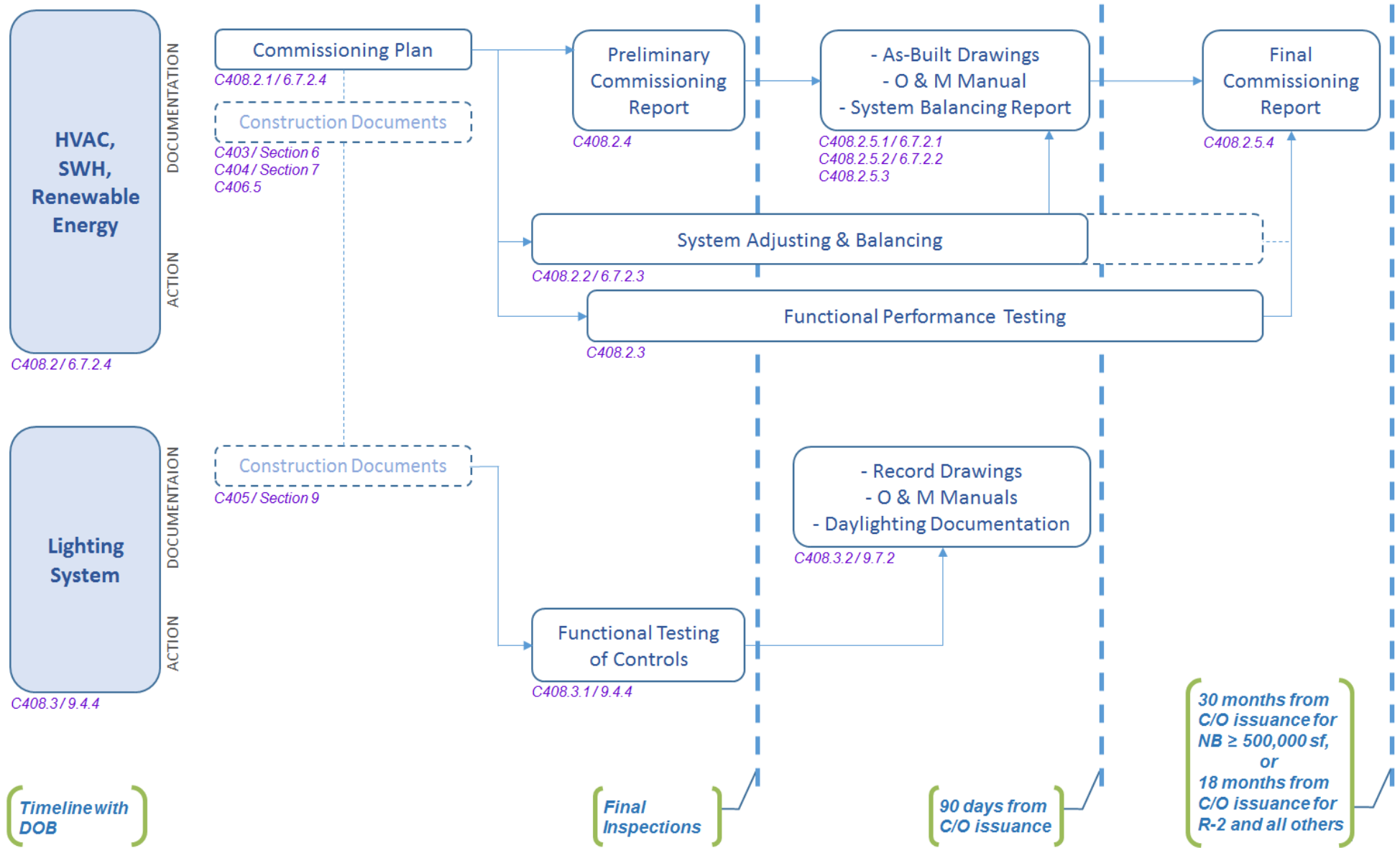


Figure OR-9. System Commissioning Work Flow

CHANGES TO EXISTING BUILDINGS

■ Compliance

- Job applications of **additions, alterations, repairs or relocation of existing buildings/structures, or changes of occupancy to existing buildings** must demonstrate compliance with the NYCECC and other governing NYC Codes that are effective as of the job application filing date.
- Job applications following ECC must comply with:
 - 1) Section R502/Section C502 for **Additions**
 - 2) Section R503/Section C503 for **Alterations**
 - 3) Section R504/Section C504 for **Repairs**
 - 4) Section R505/Section C505 for **Changes of Occupancy or Use**
- Job applications following ASHRAE must comply with:
 - 1) Provisions of Sections 5, 6, 7, 8, 9 and 10 **or** Section 11 **or** Appendix G for **Additions**
 - 2) Provisions of Sections 5, 6, 7, 8, 9 and 10 **or** Section 11 **or** Appendix G for **Alterations**
 - 3) Provisions of Sections 5, 6, 7, 8, 9 and 10 for **Repairs** and **Changes of Occupancy or Use**

R501.4
C501.4

4.2.1.2
4.2.1.3

■ Clear Scope of Work

- Construction drawings must clearly define the proposed scope of work in the existing buildings by:
 - 1) Written descriptions of all proposed changes to the existing buildings, and
 - 2) Graphical delineations of the proposed work on drawings to separate the areas affected by ‘additions, alterations, repairs, relocations, or changes of C/O’ from the areas of ‘existing-to-remain.’

1 RCNY §5000-01(g)

■ Alterations vs. Additions on ‘Historic Building’

- Repair, restoration and alteration work of, and change of occupancy to ‘Historic Building’ are exempt from the ECC compliance requirements. This base for exemption must be stated in the Professional Statement.
- The ECC exemption for ‘Historic Building’ is *limited to the National or New York State Historic Buildings*, i.e., buildings that are registered or eligible for registration as a National or New York State Historic Building, or designated as a contributing building in a National or State Historic District.; New York City-designated historic buildings are NOT exempt. For the complete definition of ‘Historic Building,’ refer to Section R202 or Section C202.
- Job applications declaring exemptions of ECC compliance for the reason of ‘Historic Buildings’ must present evidence of such eligibility on drawings. An EN- labeled drawing with Professional Statement claiming exemption from ECC compliance must also include:
 - 1) Documentation obtained from the New York State Historic Preservation Office’s online tool called CRIS* clearly indicating the subject building is listed as, or is eligible for listing as an historic building, or
 - 2) A letter from the New York State Historic Preservation Office, or the United States Department of the Interior verifying the subject building is listed as, or is eligible for listing as an historic building.
- Additions to ‘Historic Building’ are NOT exempt, and thus the ‘Added’ portion to the Historic Building *must* demonstrate compliance with the ECC according to provisions under Section R502 or Section C502.

R501.6
C501.6

* CRIS (Cultural Resource Information System): cris.parks.ny.gov

CHANGES TO EXISTING BUILDINGS

A. Additions

- In general, *altered* portions that resulted from the proposed ‘addition’ in the existing building or building system are subject to the ECC requirements for *new* buildings.
- Specifically, *Residential* buildings must demonstrate compliance by: 1) Prescriptive compliance option per Section R502.1.1, or 2) Simulated Performance Alternative (Existing plus addition compliance) option per Section R502.1.2.
- Specifically, *Commercial* buildings must demonstrate compliance by: 1) Prescriptive compliance option per Section C502.2, or 2) satisfying Appendix CA (ASHRAE 90.1) applicable sections.
- Compliance of the ‘addition’ must be demonstrated by showing that:
 - 1) The ‘addition’ portion alone complies with the ECC prescriptively; or
 - 2) The existing building and the ‘addition’ combined, as a single building, comply with the ECC through the performance path; or
 - 3) For Residential buildings, the existing building with the ‘addition’ uses no more energy than the existing building prior to the ‘addition.’

R502
C502

B. Alterations

- In general, *altered* portions that resulted from the proposed ‘alteration’ in the existing building or building system are subject to the ECC requirements for *new* buildings.
- The following alterations, provided that the energy use of the building after the ‘alteration’ is not increased, need *not* comply with the requirements for *new* buildings:
 - 1) Storm windows installed over existing fenestration
 - 2) Surface-applied window film installed on existing single-pane fenestration assemblies reducing solar heat gain
 - 3) Existing ceiling, wall or floor cavities exposed during construction, provided that cavities are completely filled with insulation
 - 4) Construction where the existing roof, wall or floor cavity is not exposed
 - 5) Roof recover
 - 6) Re-roofing of roofs without insulation in the cavity, providing new insulation either above or below the exposed sheathing (Residential buildings only)
 - 7) Alterations that replace less than 20% of the luminaires in a space (*commercial buildings only*)
 - 8) Air barriers are not required for roof recover and roof replacement unless the entire existing building envelope is in the work scope of alterations, renovations or repairs (*commercial buildings only*)
- Compliance requirements for ‘alterations’ in *Residential* buildings
 - 1) Replacement fenestration: Section R503.1.1.1
 - 2) Heating and cooling systems: Section R503.1.2
 - 3) Service hot water systems: Section R503.1.3
 - 4) Lighting: Section R503.1.4

R503
C503

CHANGES TO EXISTING BUILDINGS

B. Alterations *(continued from the previous page)*

- Compliance requirements for 'alterations' in *Commercial* buildings
 - 1) Building Envelope: Section C503.3
 - 2) Heating and cooling systems: Section C503.4
 - 3) Service hot water systems: Section C503.5
 - 4) Lighting systems: Section C503.6
- Alterations in Commercial buildings complying with Appendix CA (ASHRAE 90.1) need *not* comply with Section C503.
- Any areas converted from non-conditioned or low-energy space to conditioned space must demonstrate compliance according to Section R503 or Section C503.

R503
C503

C. Repairs

- While building maintenance and repairs must be conducted in compliance with relevant New York City Codes, work on damaged/non-damaged building components justified by the required repair/maintenance in the existing building are considered as 'repairs' work, and are *not* subject to the requirements for Alterations in Section R503/Section C503.
- The following are considered 'repairs':
 - 1) Glass-only replacements in fenestration
 - 2) Roof repairs
 - 3) Replacement of the bulb and/or ballast within the existing luminaires in a space, without increasing the installed interior lighting power
 - 4) Replacement of existing doors that separate conditioned space from the exterior, without removing the existing vestibule (Commercial buildings only)
 - 5) Air barriers are not required for roof repair unless the entire existing building envelope is in the work scope of alterations, renovations or repairs (Commercial buildings only)
- Repairs in Commercial buildings complying with Appendix CA (ASHRAE 90.1) need *not* comply with Section C504.

R504
C504

D. Change of Occupancy or Use

- Buildings/spaces seeking a *Change in Occupancy or Use* that would result in an *increase in energy use* – in demand for either fossil fuel or electrical energy – must meet the ECC requirements applicable to the new occupancy/use.
- *Residential* buildings/spaces may demonstrate compliance with this section (Section R505) by the *Simulated Performance Alternative* method (Section R405) proving that the annual energy cost of the proposed design is no more than 110% of the annual energy cost of the standard reference design.
- Spaces in *Commercial* buildings undergoing a change in use must comply with interior lighting power requirements (Section C405.4) for the new use.

R505
C505