How-to Guide:
Supporting Documentation

In Compliance with

2020 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 2020 NYCECC; 2) Not to replace or represent the entire 2020 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 2020 NYCECC and related regulations of the City of New York and the Department of Buildings.

OVERVIEW

What is Supporting Documentation?

1 RCNY §5000-01(g)
1 RCNY §5000-01(e)
ECC 101.5.2.3
ECC 103

A Requirement to Demonstrate Compliance with NYCECC

- Supporting Documentation is required for all job applications that are *not* exempt from the NYCECC in accordance with 1 RCNY §5000-01 (e)(2).
- Job applications submitted through DOB BIS indicating NYCECC Compliance in the PW1-Section 10 must submit supporting documentation *through DOB BIS*.
- Job applications with Work Types requiring DOB NOW filing must submit supporting documentation *through DOB NOW*.
- See Quick Reference Guide: How to Demonstrate Energy Code Compliance for the summary list of requirements.
- Exempt from the NYCECC Job applications claiming exemption from the 2020 NYCECC must :
  - Complete PW1-Section 10 to indicate the job is eligible to be exempt from the NYCECC, for DOB-BIS-filed jobs.
  - On drawings, provide Professional Statement for exemption (similar to the statement in PW1-Section 10), and specify the basis for exemption in accordance with 1 RCNY §5000-01 (e)(2).
  - On drawings, provide a simple Tabular Analysis listing the proposed work types and summary work scope to validate the exemption.

Essentially, Construction Documents

- To be submitted to the Department of Buildings for approval.
- To inform means and methods of construction for all energy design elements in the form of technical drawings, schedules, specification notes, etc.
- To prove that all proposed energy design elements will match or exceed the requirements of the NYCECC in their quality, quantity, size, capacity, efficiency, performance, location, configuration, composition, etc.

Must Match the Proposed Work Type and Scope

Supporting Documentation (Construction Documents) must provide construction data to match all proposed Work Types and work scope indicated in

- DOB BIS PW1-Section 6 Work Types
- DOB NOW filed Work Types, such as Mechanical Systems (MS), Plumbing (PL), and Boiler Equipment (BE)
- TR8-Section 3 and Section 4

Must Support Energy Analysis

- Construction Documents must support the Energy Analysis reports. Specifically, the values and attributes of any energy-code-regulated element proposed in the construction documents must match or exceed those of the same element listed in the Energy Analysis (e.g., Tabular analysis, REScheck, COMcheck, and EN1).
- Supporting Documentation and Energy Analysis must be submitted along with its associated work type either through DOB BIS or DOB NOW as required.
- Job applications with Energy Modeling analysis must submit the completed EN1 workbook along with the primary job filed through DOB BIS.

• *Refer to Page [GE-5] for Energy Analysis options.*

KEY PRINCIPLES

How Should Supporting Documentation be Prepared?

1 RCNY §5000-01(g)
ECC 101.5.2.3
ECC 103

▪ Identify a Correct Code Version to Follow

- Job applications filed on and after May 12, 2020 must comply with the 2020 NYCECC.
- Job applications filed between October 3, 2016 and May 11, 2020 must comply with the 2016 NYCECC.
- Refer to 'What Codes, Rules & Forms Apply When' to identify which ECC Code version is applicable for a particular job application.

▪ Identify Correct Code Sections to Follow

- *Mandatory* provisions must be satisfied by *all* applications, whereas *Prescriptive* provisions must be satisfied by applications that seek to prove compliance *prescriptively*.
- Applicable Code sections must be carefully identified and selected according to the job application/project type.
- For a Commercial building application, the ***Single*** chosen Code (NYCECC or ASHRAE; indicated as the Code compliance path on PW1–Section 10) must be referenced throughout the entire set of construction documents.

Figure GE-2.
2020 NYCECC and Applicable Job Types

2020 NYCECC		Residential Buildings		Commercial Buildings w. *NYCECC* as Code Compliance Path		Commercial Buildings w. *ASHRAE* as Code Compliance Path	
		New Buildings	Existing Buildings	New Buildings	Existing Buildings	New Buildings	Existing Buildings
Chapter 1	Administration	v	v	v	v	v	v
Chapter R2	Definitions	v	v				
Chapter R3	General Requirements	v	v				
Chapter R4	Residential Energy Efficiency	v					
Chapter R5	Existing Buildings		v				
Chapter R6	Referenced Standards	v	v				
Chapter C2	Definitions			v	v		
Chapter C3	General Requirements			v	v		
Chapter C4	Commercial Energy Efficiency			v			
Chapter C5	Existing Buildings				v		
Chapter C6	Referenced Standards			v	v		
Appendix CA	Modified Energy Standard for Buildings, Except for Low-Rise Residential Buildings (ASHRAE 90.1-2016 with NYC Modifications)					v	v

KEY PRINCIPLES

How Should Supporting Documentation be Prepared?

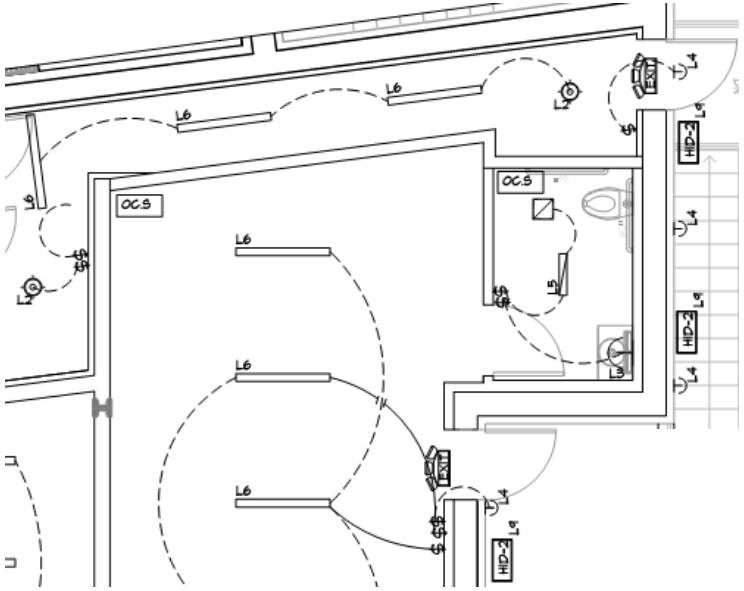
1 RCNY §5000-01(g)
ECC 101.5.2.3
ECC 103

▪ Label Energy Design Elements Consistently Among Drawings

- Identification keys for all proposed energy design elements, such as wall types, window/door types, light fixture types, mechanical equipment system types, etc., must be consistent between Supporting Documentation and Energy Analysis.

▪ Values and Attributes Must Match

- Specifications (in values and attributes) of energy design elements reported in Energy Analysis must be validated through Supporting Documentation. For example, Energy-Code-relevant specifications (e.g., insulation type, R-value, U-factor, luminaire type, luminaire wattage, equipment size, equipment efficiency, etc.) declared in the COMcheck energy analysis, but not identified in the construction documents will *not* be accepted for Energy Code compliance.
- Total numbers reported in Energy Analysis must be validated through Supporting Documentation. For example, the gross values such as exterior wall/fenestration areas, roof/floor areas, luminaire/equipment counts, area-weighted average values, etc. listed in the Tabular energy analysis must be easily identified in the drawings, schedules, and/or diagrams provided in the construction documents.



LEGEND FOR ALL LIGHT FIXTURES USED ENTIRELY FOR THE BUILDING			QUANTITY RESIDENTIAL	QUANTITY RETAIL
TAG	DESCRIPTION	FIXTURE WATT.		
L1	HIGH HAT 4" SQUARE TRIM LED	13 W	44	
L2	CEILING LIGHT ROUND LIGHT FIX COMPACT FLORESCENT	40W	21	7
L3	BATHROOM SCONCE LED	11W	18	4
L4	EXTERIOR SCONCE COMPACT FLORESCENT BALCONIES/ EXTERIOR DOORS	28 W	2/ EXT DOORS 29/ BALC.	7/ EXT DOORS
L5	CLOSET FIXTURE FLUORESCENT T8 24"	17W	30	4
L6	TEMP. FLUORESCENT T8 32W, 2 LAMPS PER FIXTURE, 48"	64W	20	79
	CEILING MOUNTED 14" ROUND FIX 3			

Proposed Interior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
1-Multifamily				
LED 1- L1 HIGH-HAT 4" FIX: LED PAR 13W:	1	44	13	572
2-Retail				
Linear Fluorescent L6: 48" T8 32W: Electronic:	2	79	64	5056
Compact Fluorescent -L2: Twin Tube 40W: Electronic:	1	7	40	280
Linear Fluorescent L5: 24" T8 17W (Super T8): Electronic:	1	4	17	68
L3-BATHROOM SCONCE: LED A Lamp 11W:	1	4	11	44
			Total Proposed Watts =	11536

Figure GE-3.
***Sample Lighting Fixture Layout Plan** (top left),*
Matching Fixture Schedule** (top right), **and
***Matching Interior Lighting COMcheck Report** (bottom right)*

KEY PRINCIPLES

How Should Supporting Documentation be Prepared?

1 RCNY §5000-01(g)
ECC 101.5.2.3
ECC 103

▪ Specific Design Data in Proper Locations

- ***Specific* design values and characteristics** proposed for the work scope in the application must be provided in the construction documents in sufficient detail and clarity. For example, window schedules on drawings must list each proposed window assembly's U-factor, SHGC, air leakage rating, and Visible Transmittance (as required) values furnished/published by the respective window manufacturer.
- **Notes directly *relevant* to achieve the proposed design** must be provided in the construction documents in sufficient detail and clarity. In other words, mere duplicates of general Energy Code sections placed on the drawings will *not* be construed as Energy Code compliance.
- **In *proper locations* within construction documents**, construction data must be presented. For example, 1) HVAC mechanical equipment schedules and a sequence-of-operations narrative must be found on Mechanical drawings; 2) Lighting control notes must be placed in conjunction with lighting fixture plans and schedules on drawings (typically on RCP drawings).

▪ List of Progress Inspections on EN- Sheet

- All *applicable* progress inspections required for Energy Code compliance must be listed on an EN- labeled sheet in tabular format as shown in 1 RCNY §5000-01(h), and must match those identified on the TR8.

AIR HANDLING UNIT SCHEDULE

TAG	LOCATION	AREA SERVED	AIR FLOW	AIR FLOW			SUPPLY FAN				CHILLED WATER									HOT WATER							RECOVERERY WHEEL
				SUPPLY	MIN OA	RETURN	TSP	BHP	HP	PH/V/RPM	EAT Db	EAT Wb	LAT Db	LAT Wb	TOT. CAP	SENS. CAP.	FLOW	EWT	LWT	EAT	LAT	TOT. CAP	SENS. CAP	FLOW	EWT	LWT	ENTHALPY
				CFM	CFM	CFM	IN			CFM	°F	°F	°F	°F	MBH	MBH	GPM	°F	°F	°F	°F	MBH	MBH	GPM	°F	°F	%
AHU-1	ROOF	3 NORTH	VAV	26000	5500	20500	4.7	23.5	25	3/460/1750	80	67	55	54	380	270	47	42	58	45	90	480	270	49	160	140	NOTE 3

NOTES:

1. PROVIDE MOTORIZED SHUT-OFF DAMPER AT THE OA INTAKE WITH MAXIMUM LEAKAGE RATE OF 4 CFM/SF AT 1 IN. WG. DAMPER SHALL CLOSE WHEN THE UNIT IS OFF.
2. IN ECONOMIZER MODE, MINIMUM OCCUPIED AIRFLOW SETPOINT ON VAV TERMINALS SHALL BE AUTOMATICALLY RESET BASED ON PERCENTAGE OF OUTSIDE AIR ABOVE DESIGN MINIMUM.
   A. AS PERCENTAGE OF OA DAMPER AT 100% AND AS ECONOMIZER OUTPUT INCREASES FROM 0-100%, MINIMUM AIRFLOW SETPOINT AT TERMINAL UNITS SHALL PROPORTIONATELY RESET LOWER TO MAINTIAN REQUIRED MINIMUM FRESH AIR VENTILATION.
   B. RESETTING SHALL OCCUR BASED ON INCREEMENTS OF 10% CHANGE OF VALUE OF ECONOMIZER OUTPUT.
3. PROVIDE HEAT WHEEL THAT SHALL RECOVER MINIMUM 50% OF THE ENTHALPY. HEATWHEEL SHALL CONTAIN A BYPASS FOR ECONOMIZER MODE.
4. AT A MINIMUM, ALL VAV TERMINAL UNITS SERVED BY AN AHU SHALL BE LINKED WITH ASSOCIATED VAV AHU CONTROLLER TO PERFORM THE FOLLOWING FUNCTIONS.
   A. ZONE OCCUPANCY SCHEDULE (USER DEFINED FROM GRAPHIC INTERFACE) SHALL NORMALLY AUTOMATICALLY SELECT THE OCCUPIED OR UNOCCUPIED OPERATING MODE OF AIR HANDLING UNIT.
      1) ACTIVATION OF TIMED OVERRIDE SWITCH ON ZONE THERMOSTATS SHALL ONLY RESET ZONE HEATING AND COOLING SETPOINTS TO "OCCUPIED" VALUES, BUT SHALL NOT AFFECT OTHERWISE SCHEDULED UNOCCUPIED OPERATING MODE OF AIR HANDLING UNIT.
   B. DUCT STATIC PRESSURE RESET AS DESCRIBED IN FAN CONTROL SECTION.
   C. DISCHARGE AIR TEMPERATURE SETPOINT –OPTIMIZED AS DESCRIBED IN THE DISCHARGE TEMPERATURE CONTROL SECTION.
5. FAN POWER LIMITATION CHECK -- PER Table C403.2.12.1(1)
   HP ≤ CFM x 0.0015
   25 ≤ 26000 x 0.0015 = 39 >> OK

Figure GE-4. ***Sample Mechanical Equipment Schedule and Notes***

ENERGY ANALYSIS

to Demonstrate ECC Compliance in conjunction with **Supporting Documentation**

* Refer to Quick Reference Guide: How to Demonstrate Energy Code Compliance for more information.

1 RCNY §5000-01(f)
ECC 101.5.2.2

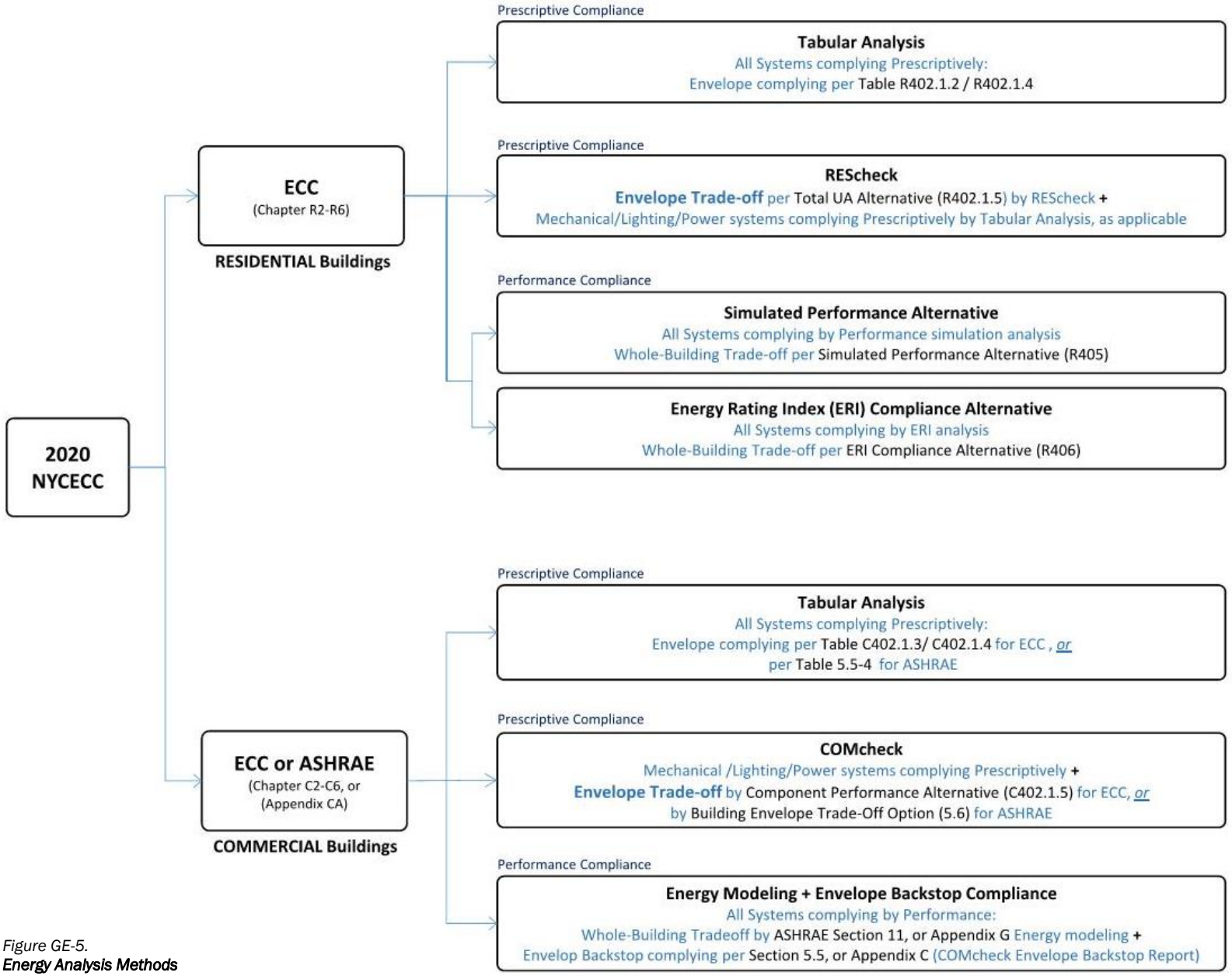


Figure GE-5.
Energy Analysis Methods

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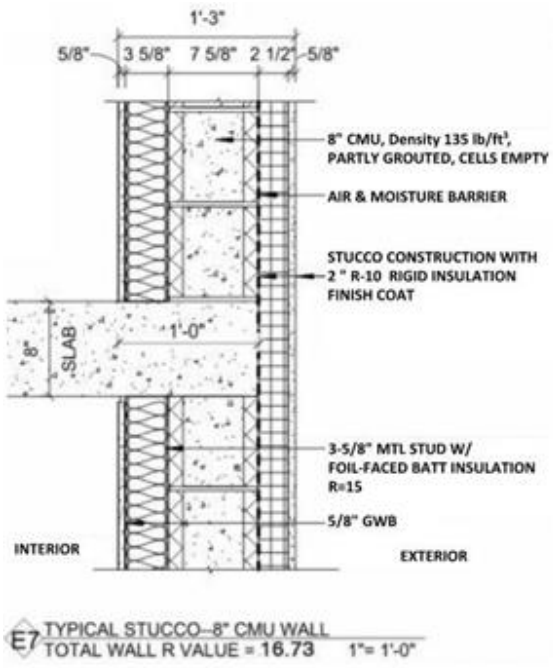
OPAQUE ENVELOPE ASSEMBLIES

Minimum R-value

- For each building envelope type (e.g., roof, above-grade/below-grade walls, floors over unconditioned space, etc.), its section detail must indicate that the R-value of the insulation meets or exceeds the minimum allowed R-value prescribed for the envelope type (e.g., R-values shown in Table C402.1.3). *R402.1.3 C402.1.3 5.5.3*
- Specifically, in the assembly details, clearly call out each of the proposed *insulation type, thickness and the manufacturer-published R-value* to satisfy the thermal requirements for the envelope assembly type.

Maximum U-factor

- Alternatively, it must be demonstrated that the proposed assembly's calculated U-factor (or C- or F-factor) value does not exceed the maximum allowed U-factor value prescribed for the envelope type (e.g., U-factors shown in Table C402.1.4). *R402.1.4 C402.1.4 5.5.3*
- Determination of an assembly's overall U-factor (or C- or F-factor) value must be supported by the pre-calculated values or the calculation methods established in Appendix A of ASHRAE 90.1-2016.
- **Spandrel Panels** are Opaque walls**.** Determination of effective U-factors for the proposed Spandrel Panels must follow Table C402.1.4.2/ Table 5.5.3. See page [BE-9]. The proposed U-factor value identified from the Table must be compared against the baseline U-factor of metal-framed walls (U-0.061) in COMcheck.



WALL TYPE E7	
Wall Assembly	**R-Value**
2" R-10 Rigid Insulation	10
8" CMU, Partly Grouted, Cells Empty	1.83 [a]
3-1/2 " R-15 Foil-faced Batt Insulation	4.9 [b]
Total R-Value of Wall Assembly	16.73
U-Factor of Wall Assembly (= 1/16.73)	**0.060**
(a) Assembly R_U for Concrete Block Walls from ASHRAE Table A3.1-3	
(b) Effective R-Value from ASHRAE Table A3.1-4	
Slab Assembly	**R-Value**
2 " R-10 Rigid Insulation	10
12"-Thick Solid Concrete Wall (Density: 144 lb/ft³)	1.60 [c]
Total R-Value of Slab Assembly	11.60
U-Factor of Slab Assembly (=1/11.60)	**0.086**
(c) Assembly R_U for Concrete from ASHRAE Table A3.1-2	

Area-Weighted Assembly U-factor Calculation for the Unit Wall			
Typical 10'-6" floor to floor height (8" slab + 9'-10" wall height)			
Assembly	**U-Factor**	**Height (in)**	**UA**
Wall Assembly	**0.060**	118	7.053
Slab Assembly	**0.086**	8	0.690
Total		126	7.743
Area-Weighted Assembly U-factor (=7.743/126)			**0.061**
Code-Allowed Maximum U-Factor (ASHRAE Table 5.5-4)			*0.090*

- *NOTE: One common error in the U-factor calculation is misrepresenting thermal values of assembly layers (e.g., face brick, gypsum board, air films, etc.) from unapproved sources.*

Figure BE-1. ***Sample Wall Assembly & Area-Weighted U-factor Calculation***

WINDOWS & DOORS – FENESTRATION IN THE ENVELOPE

U-factor and SHGC values

- For each fenestration type (e.g., fixed/operable window, skylight, exterior door, storefront, etc.), Assembly U-factor and Solar Heat Gain Coefficient (SHGC) values must be specified in the window/door schedule on drawings, and must not exceed the maximum allowed values. For Commercial building windows, the maximum assembly U-factors depend on the vertical location of the window on the above-grade wall, with more stringent U-factors for windows installed below 95' above-grade. See page [BE-3]. The 95' demarcation line must be indicated on building elevation drawings for Commercial buildings.

R402.3
C402.4
5.5.4.3
5.5.4.4
1 RCNY §5000-01 (g)(1)(i)

- Next to the U-factor and SHGC values specified in the schedule, provide the fenestration assembly manufacturer's information (e.g., '*ABC Windows/xyz 9000 series, or Approved equal*') that will satisfy the U-factor and SHGC requirements.

Air Leakage Rate and Visible Transmittance (VT)

- The window/door schedule on drawings must specify the air leakage rate of each proposed fenestration assembly type to demonstrate that the air leakage of fenestration assemblies do not exceed the maximum allowed leakage rate.

R402.4
C402.5.2/ 5.4.3.2

- Where required, the window/door schedule must identify Visible Transmittance (VT) of the proposed glazed fenestration products to meet the provisions in the applicable Code sections.

R303.1.3
C303.1.3/ C402.4.1
C405.2.3/ 5.5.4.6

WINDOW & DOOR SCHEDULE								
TAG	TYPE	FRAJE MATERIAL	NOMINAL DIM. (W X H)	MANUFACTURER - MODEL NO.	ASSEMBLY U-FACTOR	SHGC	VT	AIR LEAKAGE RATE (CFM/SF)
W1	FIXED	METAL	7'-0" X 7'-0"	ABC WINDOWS - D999 SERIES OR APPROVED EQUAL	0.28	0.34	0.50	0.16
W2	CASEMENT - OPERABLE	METAL	4'-6" X 2'-3"	ABC WINDOWS -EF00 SERIES OR APPROVED EQUAL	0.38	0.34	0.50	0.18
SW1	SKYLIGHT	METAL	2'-10" X 5'-2"	SKL CORP. - GHT000 SERIES OR APPROVED EQUAL	0.46	0.38	0.54	0.18
W5	STOREFRONT - FIXED GLAZING	METAL	VARIES; SEE A-301 ~305 FOR LOCATIONS & DIM.	GLD CO. - STR #Z111 OR APPROVED EQUAL	0.30	0.34	0.50	0.05
D1	STOREFRONT - ENTRANCE GLASS DOOR	METAL	3'-0" X 7'-6"	GLD CO. - STR #Z111 OR APPROVED EQUAL	0.70	0.36	0.52	0.80
D2	OPAQUE SWINGING DOOR	METAL	3'-0" X 7'-0"	OPQ COMPANY RST-#22-33 OR APPROVED EQUAL	0.48	N/A	N/A	0.80

Figure BE-2. ***Sample Window & Door Schedule***

- *Fenestration U-factor values must be the 'whole assembly' U-factor, instead of 'center-of-glass' U-factor, and must be furnished by the manufacturer.*
- *Differentiate Fixed and Operable windows' U-factor values in the window schedule where required, as the Code-prescribed maximum U-factors for Fixed and Operable windows may vary depending on the referenced Code.*

SPANDREL PANEL EFFECTIVE U-FACTORS

TABLE C402.1.4.2
EFFECTIVE *U*-FACTORS FOR SPANDREL PANELS[a]

FRAME TYPE	SPANDREL PANEL	RATED R-VALUE OF INSULATION BETWEEN FRAMING MEMBERS						
		R-4	R-7	R-10	R-15	R-20	R-25	R-30
Aluminum without Thermal Break[b]	Single glass pane, stone, or metal panel	0.242	0.222	0.212	0.203	0.198	0.195	0.193
	Double glass with no low-e coatings	0.233	0.218	0.209	0.202	0.197	0.194	0.192
	Triple or low-e glass	0.226	0.214	0.207	0.200	0.196	0.194	0.192
Aluminum with Thermal Break[c]	Single glass pane, stone, or metal panel	0.211	0.186	0.173	0.162	0.155	0.151	0.149
	Double glass with no low-e coatings	0.200	0.180	0.170	0.160	0.154	0.151	0.148
	Triple or low-e glass	0.191	0.176	0.167	0.159	0.153	0.150	0.148
Structural Glazing[d]	Single glass pane, stone, or metal panel	0.195	0.163	0.147	0.132	0.123	0.118	0.114
	Double glass with no low-e coatings	0.180	0.156	0.142	0.129	0.122	0.117	0.114
	Triple or low-e glass	0.169	0.150	0.138	0.127	0.121	0.116	0.113
No framing or Insulation is Continuous[e]	Single glass pane, stone, or metal panel	0.148	0.102	0.078	0.056	0.044	0.036	0.031
	Double glass with no low-e coatings	0.136	0.097	0.075	0.054	0.043	0.035	0.030
	Triple or low-e glass	0.129	0.093	0.073	0.053	0.042	0.035	0.030

C402.1.4.2
5.5.3

- *NOTE 1: To demonstrate compliance, provide COMcheck envelope analysis by:*

  - entering the Proposed Spandrel panel U-factor value identified from the Table C402.1.4.2; and

  - choosing the Baseline U-factor of metal-framed walls (U-0.061).

- *NOTE 2: If the Proposed Spandrel panel type is not found in the Table – e.g., Assembly with backpans, Assembly with no insulation – THERM Analysis must be performed and documented on drawings.*

  Info for THERM is found in the link below.
  https://windows.lbl.gov/software/therm

COMMERCIAL BUILDING FENESTRATION MAXIMUM U-FACTORS

TABLE C402.4
BUILDING ENVELOPE FENESTRATION MAXIMUM U-FACTOR AND SHGC REQUIREMENTS

CLIMATE ZONE	4 EXCEPT MARINE	
	Vertical fenestration	
	U-factor[a]	
	Below 95'[b]	95' and above[b]
Nonmetal framing (all)	0.28	0.28
Metal framing fixed	0.30	0.36
Metal framing operable	0.40	0.42
Curtainwall fixed	0.36	0.36
Entrance doors	0.77	

See Table 5.5-4 for ASHRAE-following job applications.

C402.4
5.5.4.3

- *NOTE: Where any portion of the window unit is installed above 95' above-grade, U-factor requirement of 95' and above may apply.*

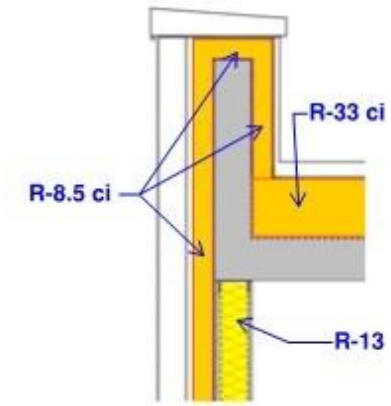
CONTINUOUS INSULATION

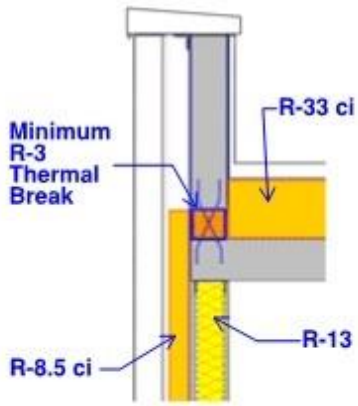
Balconies and Parapets

C402.2.9
5.5.3.7

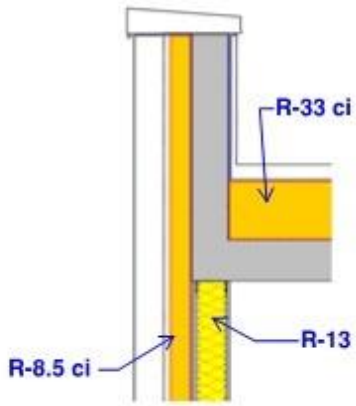
Balconies and Parapets that interrupt the building thermal envelope are required to be:

a) Insulated with continuous insulation of a minimum R-value for the wall assembly as listed in Table C402.1.3/ Table 5.5-4. ***OR***
b) Insulated with a minimum R-3 thermal break where the structural element penetrates the building thermal envelope.

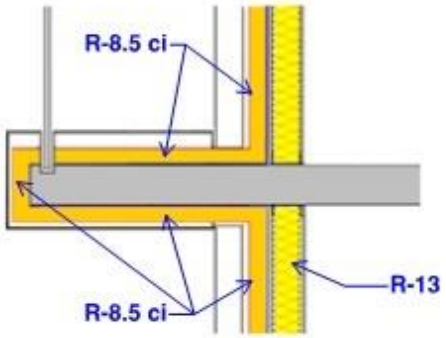


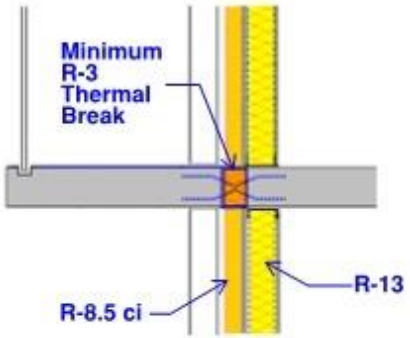


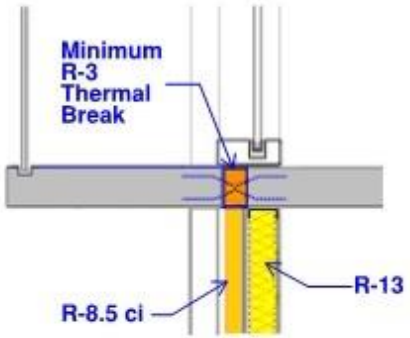
- *NOTE: Compliance with the continuous insulation requirements on balconies and parapets does not relieve compliance requirements of other applicable Construction Codes. For example, BC Chapter 16 and Chapter 33 requirements must be met for parapets in case of future C-hooks/ clamps use on the parapet walls.*



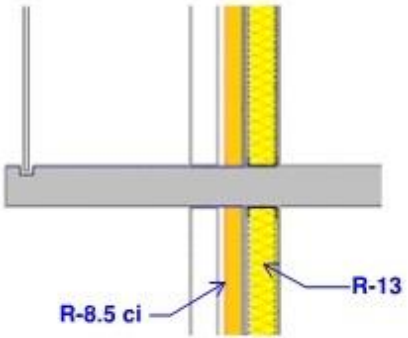
To report R-value of Parapet as a Roof component in COMcheck Envelope Analysis, click Here.







a) COMPLIANT with C402.2.9/ 5.5.3.7



To report R-value of Balcony slab as a Wall component in COMcheck Envelope Analysis, refer to [BE- 11].

b) NOT COMPLIANT with C402.2.9/ 5.5.3.7

Figure BE-4. ***Examples of Balcony and Parapet Insulation***

FENESTRATION AREA

The ***Window-to-Wall Ratio (WWR)*** -- the ratio (%) of vertical fenestration area to gross above-grade wall area (or gross wall area for Appendix CA applications) -- must be noted on an EN- labeled drawing in conjunction with building envelope diagrams and the envelope energy analysis. The building envelope diagrams must list all opaque wall areas and vertical fenestration areas per each building orientation. The area values of each opaque wall type and fenestration type listed in the envelope diagrams must match the values entered in the envelope energy analysis (e.g., 'Gross Area' values in COMcheck).

▪ Maximum Vertical Fenestration Area *(when following **ECC**)*

C402.4.1

- ***Maximum WWR***: 30%
- ***Maximum WWR***: 40% *permitted with certain requirements including daylight responsive controls*
- ***When WWR*** > 40%: **ASHRAE** must be chosen as Code Compliance Path, as ECC does not allow WWR > 40%.

▪ Maximum Vertical Fenestration Area *(when following **ASHRAE**)*

5.5.4.2.1

- ***Maximum WWR***: 40%
- ***When WWR*** > 40%: Energy Code compliance may be demonstrated through either
  a) **COMcheck** (with envelope tradeoff) envelope analysis, or
  b) **Energy Modeling** (total building performance) energy analysis.

▪ Maximum Skylight Fenestration Area

C402.4.1
5.5.4.2.2

- ***Maximum*** **skylight** fenestration area: **3%** of the gross roof area
- ***Maximum*** **skylight** fenestration area: **6%** of the gross roof area *permitted with daylight responsive controls*

▪ Minimum Skylight Fenestration Area

C402.4.2
5.5.4.2.3

- For an enclosed space
  - ≥ 2,500 sf, and directly under a roof with ceiling height > 15' and
  - of space types including office, lobby, atrium, concourse, corridor, warehouse storage, among others

Minimum **skylight** fenestration *area requirement*: ***Minimum 3%*** of the gross roof area, *or*
Minimum 1% 'Skylight Effective Aperture'

- **See Section C402.4.2 and 5.5.4.2.3 for complete applicable space types, minimum total daylight area requirement, and definition of 'Skylight Effective Aperture.'**

AIR BARRIER

Continuous Air Barrier

To ensure air barrier continuity in the building thermal envelope, drawings must specify required continuous air barrier construction measures (Section C402.5.1.1), and indicate that the continuous air barrier shall be achieved by either

C402.5.1
5.4.3.1.2
5.4.3.1.3

1) **Materials** not exceeding maximum allowed air permeability (Section C402.5.1.2.1), or
2) **Assemblies** not exceeding allowed maximum air leakage (Section C402.5.1.2.2).

Openings in the Building Envelope

Drawings must identify specific construction measures, configuration, devices and/or performance standards to limit air leakage in particular envelope areas including, but not limited to, the following:

C402.5/5.4.3.1.1

1) **Fenestration and doors**: Maximum allowed air leakage. *C402.5.2/5.4.3.2*
2) **Outdoor air intakes and exhaust openings**: Motorized Shutoff dampers are required unless gravity dampers are allowed. *C402.5.5/6.4.3.4*
3) **Doors/Access Openings to shafts, chutes, vents, stairways and elevator lobbies**: Gasketing, weatherstripping, and sealing. *C402.5.4/5.4.3.1.2*
4) **Loading dock**: Weatherseals to restrict infiltration. *C402.5.6/5.4.3.3*
5) **Vestibules***: Plan configuration and self-closing devices on doors. *C402.5.7/5.4.3.4*

   * *Note that Air Curtains are NO longer an acceptable alternative.* *C402.5.8/5.4.3.1.1*

6) **Recessed lighting**: Luminaires installed in building envelope must be:
   a) IC-rated, b) Labeled with the Code-prescribed maximum air leakage rate, *and* c) Sealed with gasket or caulk.

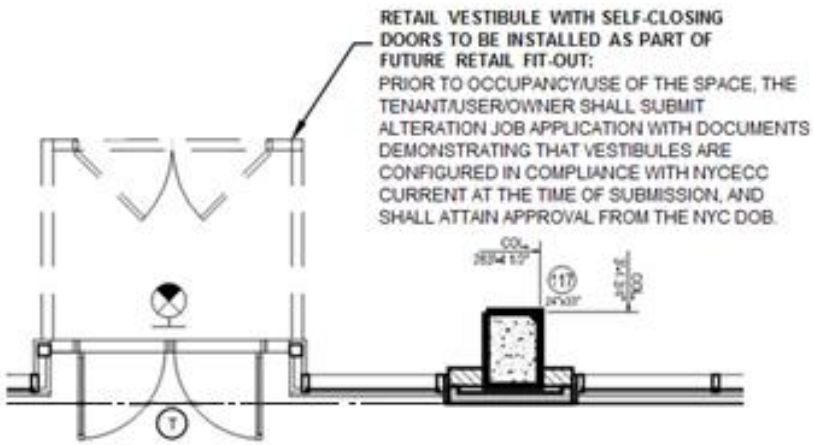


Figure BE-6.
A Sample Acceptable Plan with Specific Notes Requiring Future Compliance

AIR LEAKAGE/BARRIER TESTING & AIR BARRIER CONTINUITY PLAN – NEW BUILDINGS

Drawings must specify mandatory air barrier testing/inspection requirements specific to the building type.

▪ Residential Buildings – See R202 for the definition of Residential Building

1 RCNY §5000-01 (g)(5)(iv)

Building Types	Required Testing/Inspection	Required Progress Inspections	Reference Code
• New buildings with 1 dwelling unit	(A) AND (B)	IA6 AND IA7	**R402.4.1.2**
• New buildings with dwelling units ≥ 2	(A) AND (B) or (C)	IA6 AND IA7	**R402.4.1.3**
• New buildings with dwelling units ≥ 8	(A) AND (B) or (D)	IA6 AND IA7	**R402.4.1.3.1**

(A) Visual Inspection of Air Barrier
Visual inspection of openings and penetrations in the building envelope, including site-built fenestration and doors to verify continuous air barrier installation

(B) Whole Building Air Leakage Testing [maximum 3 ACH]
Testing conducted at a pressure differential of 50 Pascals must verify that the Building air leakage rate does not exceed 3 air changes per hour (3 ACH).

(C) Air Leakage Testing of ALL "Testing Units"
Testing conducted at a pressure differential of 50 Pascals must verify that the air leakage rate of EACH testing unit does not exceed 0.3 cfm/sf of the testing unit envelope.

(D) Air Leakage Testing of SAMPLE "Testing Units"
Testing conducted at a pressure differential of 50 Pascals must verify that the air leakage rate of EACH Sample testing unit does not exceed 0.3 cfm/sf of the testing unit envelope. SAMPLE Testing Unit selection must follow the code provision.

▪ Commercial Buildings – See C202 for the definition of Commercial Building

1 RCNY §5000-01 (g)(5)(iv)

Building types	Required Testing/Inspection	Required Progress Inspections	Reference code
• **New buildings with conditioned space < 10,000 sf**	**(A)**	IIA6	**1 RCNY §5000-01 (g)(5)(iv) 5.9**
• **New buildings with conditioned space ≥ 10,000 sf and < 50,000 sf, and Height ≤ 75'**	**(A) AND (E)**	IIA6 AND IIA7	**C402.5.1.3 5.4.3.1.3 5.9**
• **R-2 occupancy Only: New Buildings with conditioned space ≥ 10,000 sf and < 50,000 sf, and Height ≤ 75'**	**(A) AND (E) or (D)**	IIA6 AND IIA7	**C402.5.1.3 5.4.3.1.3 5.9**
• **New buildings with conditioned space ≥ 10,000 sf and < 50,000 sf, and Height > 75'** • **New buildings with conditioned space ≥ 50,000 sf**	**(A) AND (F) or (D) or (E)**	IIA6 AND IIA8 or IIA7	**C402.5.1.3 5.4.3.1.3 5.9**
• R-3 occupancy Only: all **New Buildings**	**(A) AND (B) or (C)**	IIA6 AND IIA7	**C401.2.1**

(E) Whole Building Air Leakage Testing [maximum 0.4 cfm/sf]
Testing conducted at a pressure differential of 75 Pascals must verify that the Building air leakage rate does not exceed 0.4 cfm/sf of the building envelope.

(F) Testing/Inspection conducted per Air Barrier Continuity (ABC) Plan
Air Barrier Continuity Plan must be developed to specify the below.
- **List (Schedule of Details) of each unique assembly, joint, seam and penetration, keyed to building thermal/air boundary section diagrams (on Architectural Plans)**
- **Testing/Inspection standards (e.g., ASTM E1186) and performance criteria for each assembly, joint, seam and penetration type (on Architectural Plans)**
- **Specifications of sealing (continuity-ensuring) materials/measures, and Remediation procedures**
- **Sampling protocol, if applicable, and Test reporting/submittal guidelines**

ABC Plan, and Final Reports of Testing/Inspection conducted per the ABC Plan shall be provided to DOB upon request.

AIR LEAKAGE/BARRIER TESTING & AIR BARRIER CONTINUITY PLAN – ADDITIONS & ALTERATIONS

Drawings must specify mandatory air barrier testing/inspection requirements specific to the building type.

▪ Residential Buildings – See R202 for the definition of Residential Building

1 RCNY §5000-01 (g)(5)(iv), R502, R503

Building Types	Required Testing/Inspection	Required Progress Inspections	Reference Code
• Any Additions • Alterations to the existing building envelope	(A)	IA6	**R402.4.1.**
• Additions thermally isolated from the existing building envelope • Alterations of the entire existing building envelope including air barrier	(A) AND (B)	IA6 AND IA7	**R402.4.1.2**
• Additions with dwelling units ≥ 2	(A) AND (B) or (C)	IA6 AND IA7	**R402.4.1.3**
• Additions with dwelling units ≥ 8	(A) AND (B) or (D)	IA6 AND IA7	**R402.4.1.3.1**

(A) Visual Inspection of Air Barrier
Visual inspection of openings and penetrations in the building envelope, including site-built fenestration and doors to verify continuous air barrier installation

(B) Whole Building Air Leakage Testing [maximum 3 ACH]
Testing conducted at a pressure differential of 50 Pascals must verify that the Building air leakage rate does not exceed 3 air changes per hour (3 ACH).

(C) Air Leakage Testing of ALL "Testing Units"
Testing conducted at a pressure differential of 50 Pascals must verify that the air leakage rate of EACH testing unit does not exceed 0.3 cfm/sf of the testing unit envelope.

(D) Air Leakage Testing of SAMPLE "Testing Units"
Testing conducted at a pressure differential of 50 Pascals must verify that the air leakage rate of EACH Sample testing unit does not exceed 0.3 cfm/sf of the testing unit envelope. SAMPLE Testing Unit selection must follow the code provision.

▪ Commercial Buildings – See C202 for the definition of Commercial Building

1 RCNY §5000-01 (g)(5)(iv), C502, C503

Building types	Required Testing/Inspection	Required Progress Inspections	Reference code
• **Additions with conditioned space < 10,000 sf** • **Alterations to the existing building envelope**	**(A)**	IIA6	**1 RCNY §5000-01 (g)(5)(iv), C503.3**
• **Additions with conditioned space ≥ 10,000 sf and < 50,000 sf, & Height ≤ 75'** • Alterations of the entire existing building envelope including air barrier	**(A) AND (E)**	IIA6 AND IIA7	**C402.5.1.3 5.4.3.1.3**
• **R-2 occupancy Only: Additions with conditioned space ≥ 10,000 sf and < 50,000 sf, and Height ≤ 75'**	**(A) AND (E) or (D)**	IIA6 AND IIA7	**C402.5.1.3 5.4.3.1.3**
• **Additions with conditioned space ≥ 10,000 sf and < 50,000 sf, & Height > 75'** • **Additions with conditioned space ≥ 50,000 sf**	**(A) AND (F) or (D) or (E)**	IIA6 AND IIA8 or IIA7	**C402.5.1.3 5.4.3.1.3**
• R-3 occupancy Only: Additions thermally isolated from the existing building envelope	**(A) AND (B) or (C)**	IIA6 AND IIA7	**C401.2.1**

(E) Whole Building Air Leakage Testing [maximum 0.4 cfm/sf]
Testing conducted at a pressure differential of 75 Pascals must verify that the Building air leakage rate does not exceed 0.4 cfm/sf of the building envelope.

(F) Testing/Inspection conducted per Air Barrier Continuity (ABC) Plan
Air Barrier Continuity Plan must be developed to specify the below.
- **List (Schedule of Details) of each unique assembly, joint, seam and penetration, keyed to building thermal/air boundary section diagrams (on Architectural Plans)**
- **Testing/Inspection standards (e.g., ASTM E1186) and performance criteria for each assembly, joint, seam and penetration type (on Architectural Plans)**
- **Specifications of sealing (continuity-ensuring) materials/measures, and Remediation procedures**
- **Sampling protocol, if applicable, and Test reporting/submittal guidelines**

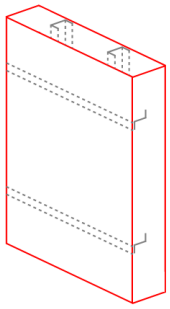
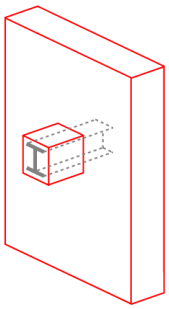
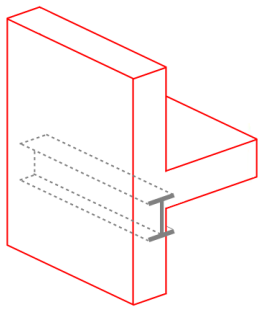
ABC Plan, and Final Reports of Testing/Inspection conducted per the ABC Plan shall be provided to DOB upon request.

THERMAL BRIDGES IN BUILDING ENVELOPE

▪ Documentation of Thermal Bridges

1 RCNY §5000-01
(g)(1)(iii)
R402.6
C402.6
5.4.4

- Architectural plan set drawings must report all thermal bridges in the building thermal envelope in ***three categories*** below.
- Documentation requirements apply to Residential and Commercial buildings for all New buildings, Additions, and Alterations to the building envelope work scope.

Category	**CLEAR FIELD** Thermal Bridge	**POINT** Thermal Bridge	**LINEAR** Thermal Bridge
Definition	Area-based thermal transmittance associated with elements of a building envelope assembly which repeat at regular intervals. Most clear field thermal bridges are taken into account in the assembly types found in ASHRAE 90.1-2016 Appendix A.	Element-based thermal transmittance associated with a discrete element that penetrates the building envelope. Point thermal transmittance is heat flow divided by the temperature difference between the interior and exterior sides of the assembly, represented by a **X-value** (Chi-Value) in units Btu/hr • °F.	Length-based thermal transmittance associated with horizontal, vertical, or diagonal elements within the building envelope Linear thermal transmittance is heat flow divided by length and by the temperature difference between the interior and exterior sides of the assembly, represented by a **Ψ-value** (Psi-Value) in units Btu/hr • ft • °F.
Typical Assemblies	Wall assembly with metal studs, or brick ties, or z-girts	A beam penetrating a wall, A column penetrating a roof or floor, An anchor or connection used to attach an element to the building	Balcony, Floor, Fenestration perimeter transition, Parapet, Floor slab edge, Shelf angle
Sample Illustration			
Documentation Requirements on Architectural Plan Set	- List of CLEAR FIELD Thermal Bridges - How they are entered in Envelope energy analysis - Reference section detail locations	- List of POINT Thermal Bridges ≥ 8 in^2 for Residential buildings, and ≥ 12 in^2 for Commercial buildings - Size and quantity of each thermal bridge type - Reference section detail locations	- List of LINEAR Thermal Bridges - Ψ-value of each thermal bridge type and its source - Total length of each thermal bridge - How they are entered in Envelope energy analysis - Reference section detail locations

[EXAMPLE] DOCUMENTATION OF THERMAL BRIDGES (REQUIRED IN ARCHITECTURAL PLANS)

CLEAR FIELD Thermal Bridges

CFTB.no	Assembly/Thermal Bridge Description	Assembly ID in Energy Analysis[1]	Section Detail Location
CFTB.1	Concrete roof deck with R-33ci	RF-1	A-502/4
CFTB.2	Concrete roof deck with R-30ci	RF-2	A-502/5
CFTB.3	CMU wall, EIFS finish	WT-1	A-501/1
CFTB.4	CMU wall, Metal panel cladding	WT-2	A-501/2
CFTB.5	Spandrel wall – Aluminum frame w. thermal break, Single pane glass, Metal panel	WT-3	A-508/4
CFTB.6	Mass floor over parking garage	FL-1	A-503/5
CFTB.7	Mass floor over unconditioned space at courtyard	FL-2	A-503/6

1. Envelope COMcheck report on EN-004

POINT Thermal Bridges

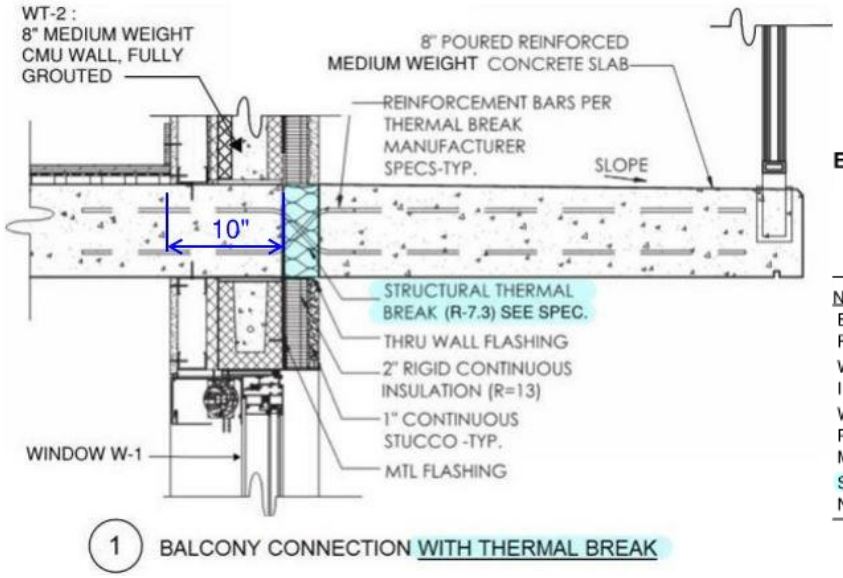
PTB.no	Assembly/Thermal Bridge Description	Size [sq. inches]	Number of Occurrence	Section Detail Location
PTB.1	Structural beam penetration on walls @ courtyard	14	6	A-502/7
PTB.2	Structural column (pilotis) penetrating 2nd floor slab/soffit @ courtyard	21	4	A-504/1
PTB.3	Main entrance canopy structural member penetration on walls	9	2	A-504/2

LINEAR Thermal Bridges

LTB.no	Type of Thermal Bridge	Ψ- Value [Btu/hr•ft•°F]	Ψ- Value Source/ Calculation	Total Length [ft]	Assembly ID in Energy Analysis[1]	Section Detail Location
LTB.1	Parapet	0.42	Default value from Table C402.6	284	n/a	A507/1
LTB.2	Balcony	0.45	Ψ- Value of better performing details per BC Hydro Building Envelope Thermal Bridging Guide v.1.2	34	WT-B	A507/7
LTB.3	Floor Slab Edge-1	0.44	Default value from Table C402.6	72	WT-SE1	A507/2
LTB.4	Floor Slab Edge-2	0.40	Ψ- Value of better performing details per BC Hydro Building Envelope Thermal Bridging Guide v.1.2	21	WT-SE2	A507/3
LTB.5	Fenestration Perimeter	0.32	Default value from Table C402.6	617	n/a	A702/1, A702/2, A702/5, A702/6
LTB.6	Shelf Angle	0.41	Default value from Table C402.6	65	n/a	A508/2, A508/3

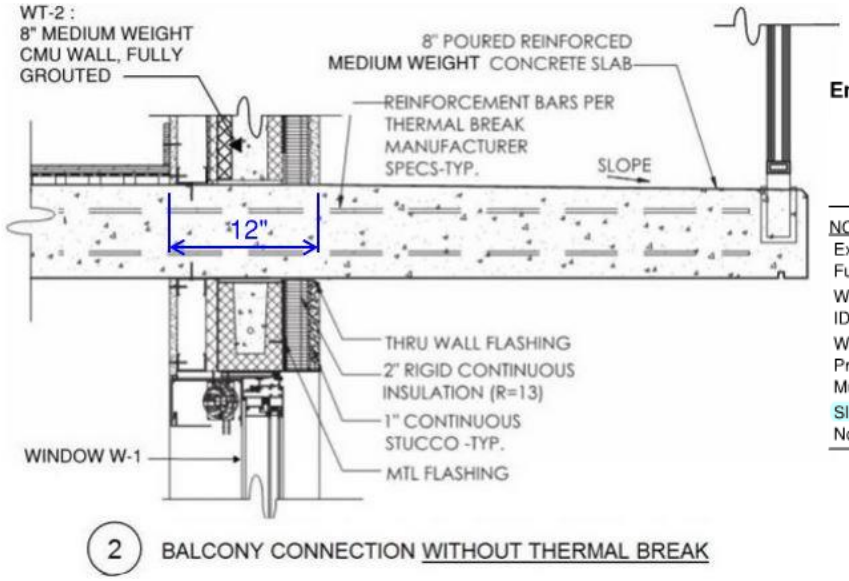
1. Envelope COMcheck report on EN-004

DOCUMENTING THERMAL BRIDGES IN BALCONY SLAB



Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U-Factor(a)
NORTH					
Exterior Wall 1: Concrete Block:8", Solid Grouted, Medium Density, Furring: None, [Bldg. Use 1 - Multifamily]	3780	---	13.0	0.066	0.086
Window 1: Metal Frame:Fixed, 95' above-grade, Perf. Specs.: Product ID WT1, SHGC 0.36, < 95' above-grade, [Bldg. Use 1 - Multifamily] (b)	580	---	---	0.380	0.300
Window 2: Metal Frame:Fixed, >= 95' above-grade, Perf. Specs.: Product ID WT2, SHGC 0.36, >= 95' above-grade, [Bldg. Use 1 - Multifamily] (b)	720	---	---	0.380	0.360
Slab edge1: Solid Concrete:10" Thickness, Medium Density, Furring: None, [Bldg. Use 1 - Multifamily]	255	---	7.3	0.103	0.086



Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U-Factor(a)
NORTH					
Exterior Wall 1: Concrete Block:8", Solid Grouted, Medium Density, Furring: None, [Bldg. Use 1 - Multifamily]	3780	---	13.0	0.066	0.086
Window 1: Metal Frame:Fixed, 95' above-grade, Perf. Specs.: Product ID WT1, SHGC 0.36, < 95' above-grade, [Bldg. Use 1 - Multifamily] (b)	580	---	---	0.380	0.300
Window 2: Metal Frame:Fixed, >= 95' above-grade, Perf. Specs.: Product ID WT2, SHGC 0.36, >= 95' above-grade, [Bldg. Use 1 - Multifamily] (b)	720	---	---	0.380	0.360
Slab edge1: Solid Concrete:12" Thickness, Medium Density, Furring: None, [Bldg. Use 1 - Multifamily]	255	---	0.0	0.450	0.086

Figure BE-11.
Sample Balcony Edge Details & Matching Envelope COMcheck Reports

BUILDING ENVELOPE TRADEOFFS

When not all building envelope components individually could meet the prescriptive minimum insulation requirements, compliance with ECC Envelope provisions could be demonstrated through Envelope Tradeoffs.

▪ Trade-Offs for Residential Buildings – Total UA Alternative

R402.1.5

- To accomplish compliance with ECC Envelope provisions through Envelope Tradeoffs, Residential building envelope components must demonstrate that:

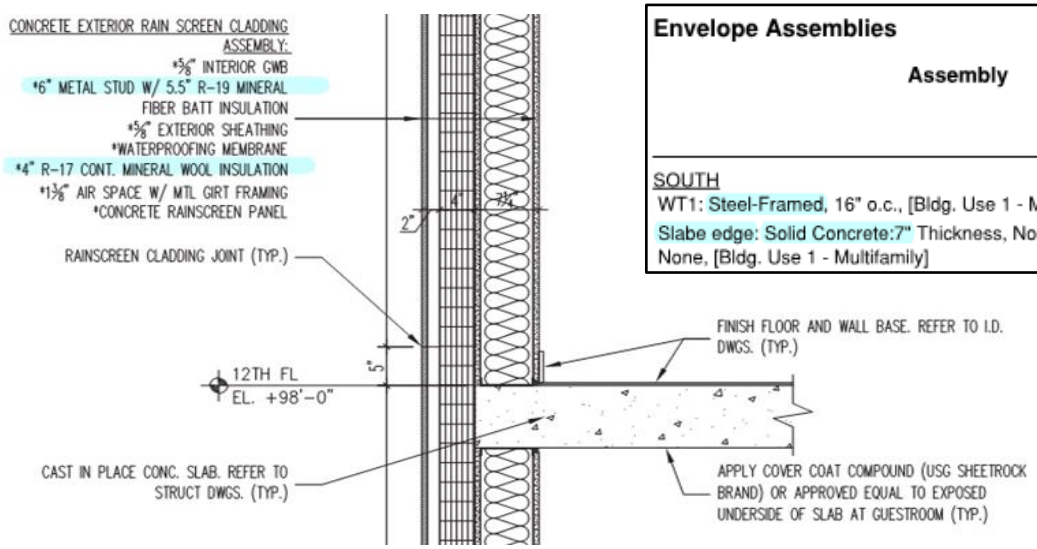
  Total building thermal envelope UA < **Total UA resulting from the Code-prescriptive U-factors**
  (Sum of Assembly area x its U-factor) *(Sum of Assembly area x Code U-factor value for the assembly type)*

- Compliance could be verified by the *REScheck* envelope energy analysis by entering all building envelope components' varying thermal values.

▪ Trade-Offs for Commercial Buildings – Component Performance Alternative [following ECC] – Buildings Envelope Trade-Off Option [following ASHRAE]

C402.1.5
5.6

- To accomplish compliance with ECC Envelope provisions through Envelope Tradeoffs, Commercial building envelope components must satisfy the formula in C402.1.5 for ECC, and the provision in 5.6.1.b for ASHRAE (calculation per Appendix C of ASHRAE).
- Compliance could be verified by the *COMcheck* envelope energy analysis by entering all building envelope components' varying thermal values.



Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U-Factor(a)
SOUTH					
WT1: Steel-Framed, 16" o.c., [Bldg. Use 1 - Multifamily]	5360	19.0	17.0	0.038	0.061
Slabe edge: Solid Concrete:7" Thickness, Normal Density, Furring: None, [Bldg. Use 1 - Multifamily]	378	---	17.0	0.053	0.086

Figure BE-12.
Sample Slab Edge Detail & Matching Envelope COMcheck Report

EQUIPMENT PENETRATIONS IN BUILDING ENVELOPE

Calculation of Equipment Penetration Areas

When mechanical equipment listed in Table C403.3.2(3) or Table 6.8.1-4 are proposed in a *New Commercial* building application:

C402.1.4.2
5.5.3

- Drawings must identify the calculated total area of the equipment penetrations in the opaque above-grade walls by the supporting diagrammatic building elevations.
- Drawings must also identify the percentage of the total equipment penetration area out of the total opaque above-grade wall area.

U-factor 0.5 for Penetration Areas > 1% of Opaque Walls

C402.1.4.2
C402.1.5
5.6.1.1

- If the total area of penetrations from mechanical equipment specified above *exceeds 1%* of the total opaque above-grade wall area, the equipment penetration area must be identified as a separate wall assembly with a *default U-factor of 0.5*.
- Accordingly, in the envelope energy analysis (e.g., Component performance alternative calculation, COMcheck, or Energy Modeling) the total equipment penetration area must be entered as a separate exterior wall type of proposed U-factor 0.5 and budget U-factor identical to the surrounding wall.

Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U-Factor(a)
SOUTH					
Exterior Wall - Type 1A: Concrete Block:8", Partially Grouted, Cells Empty, Normal Density, Furring: None, [Bldg. Use 1 - Multifamily]	4350	---	10.0	0.082	0.086
Window - WF1: Metal Frame:Fixed, >= 95' above-grade, Perf. Specs.: Product ID WF1, SHGC 0.36, >= 95' above-grade, [Bldg. Use 1 - Multifamily] (c)	78	---	---	0.350	0.360
Window - WO1: Metal Frame:Fixed, 95' above-grade, Perf. Specs.: Product ID WO1, SHGC 0.36, < 95' above-grade, [Bldg. Use 1 - Multifamily] (c)	1568	---	---	0.420	0.300
Mech PTAC Units Through-Wall: Other Mass Wall, Heat capacity 5.0, [Bldg. Use 1 - Multifamily] (b)	462	---	---	0.500	0.086

Figure BE-13.
Sample Envelope COMcheck report with Equipment Penetration Area entered as a separate opaque wall type

FUEL-BURNING APPLIANCES

Thermally Isolated and Insulated Rooms

When open combustion air ducts provide combustion air to open combustion fuel-burning appliances (e.g., natural draft boilers or furnaces) in a room, the room must be thermally isolated from the building it serves, and sealed and insulated to meet the requirements of Table R402.1.2, Table C402.1.3 or C402.1.4.

R402.4.4
C402.5.3

Direct Vent Appliances

If the fuel-burning appliances are to be located in a room within the building thermal envelope, the appliances must be identified as direct vent appliances with both intake and exhaust pipes installed continuous to the outside.

R402.4.4
C402.5.3

Fireplaces with Tight-fitting Doors or Dampers

Fireplaces or fireplace units that are designed to allow an open burn must be specified with tight-fitting flue dampers or tight-fitting doors labeled with applicable Code-required UL listings.

R402.4.2
C402.2.8

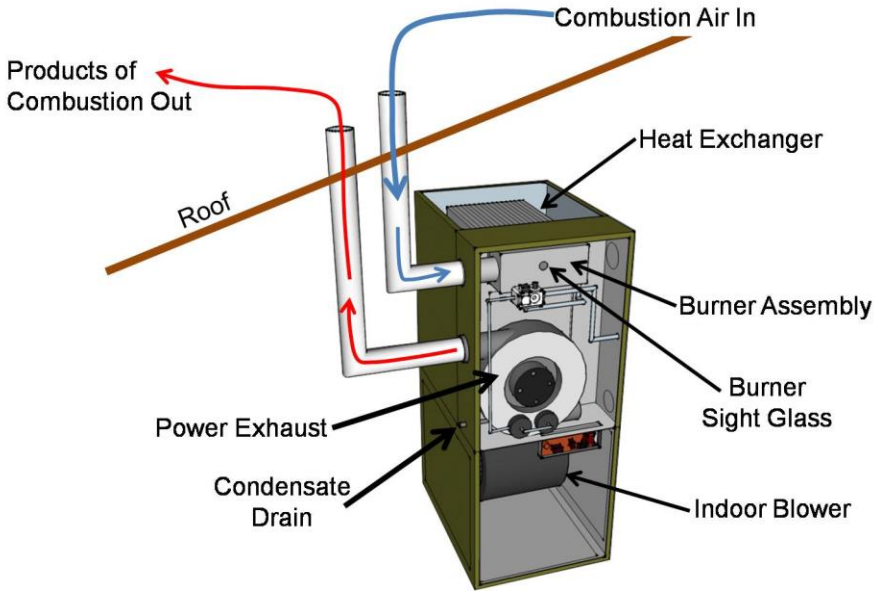


Figure BE-14. ***A direct-vent sealed-combustion furnace with dedicated pipes for combustion air and exhaust installed continuous to the outside***
Source: basc.pnnl.gov/images

FENESTRATION ORIENTATION – ASHRAE-ONLY, PRESCRIPTIVE[1] REQUIREMENTS

- **The Vertical Fenestration on the West- and East-Oriented Walls**
  (must comply with either ***A*** or ***B*** below)

A) Limiting Fenestration Area

5.5.4.5

West-oriented vertical fenestration area must be ≤ 1/4 of the Total vertical fenestration area,

and

East-oriented vertical fenestration area must be ≤ 1/4 of the Total vertical fenestration area.

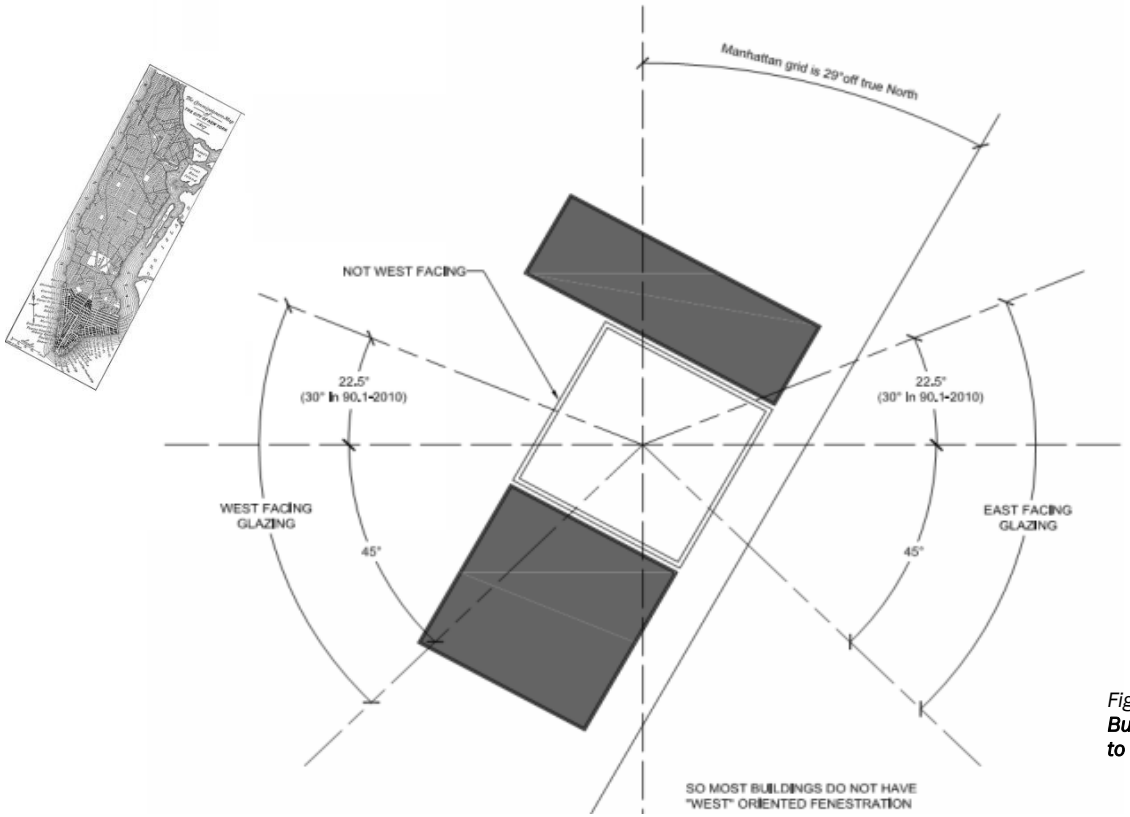
B) Limiting SHGC Values

5.5.4.5

West-oriented vertical fenestration area x SHGC for West-oriented fenestration must be ≤
1/4 of the Total vertical fenestration area x Code-prescribed maximum SHGC for Climate Zone 4a (from Table 5.5-4),

and

East-oriented vertical fenestration area x SHGC for East-oriented fenestration must be ≤
1/4 of the Total vertical fenestration area x Code-prescribed maximum SHGC for Climate Zone 4a (from Table 5.5-4).



1. ***Prescriptive*** *requirements MUST be met when Prescriptive energy analysis method (e.g., Tabular analysis) is chosen to demonstrate Energy Code compliance. If COMcheck or Energy Modeling is used for the energy analysis, the software program automatically takes into account the vertical fenestration areas and SHGC values on the west and east-oriented wall in its computation.*

Figure BE-15.
Buildings on Manhattan's grid ± 29° off of true north are likely to have no West-oriented vertical fenestration

RESIDENTIAL BUILDING ENVELOPE

Blown or Sprayed Roof/Ceiling Insulation

- The thickness of blown-in or sprayed roof/ceiling insulation (fiberglass or cellulose) in the attic must be indicated on markers for every 300 sf. *R303.1.1.1*
- The markers must indicate minimum initial installed thickness with numbers of a minimum of 1 inch in height.

Protection of Exposed Foundation Insulation

Rigid, opaque and weather-resistant protective coverings must be applied to protect the insulation over the exterior of basement walls, crawl space walls and the perimeter of slab-on-grade floors. *R303.2.1*

Slab-on-Grade Floor Insulation at the Perimeter

- Slab-on-grade floors with a floor surface < 12" below-grade must be insulated at the slab perimeter with minimum R-10. For Heated slab floors on-grade, R-10 insulation must be provided under the full heated slab area in addition to the required slab perimeter insulation of minimum R-10. *R402.2.10*
- The insulation must be extended downward or horizontally (as shown in the Figures below) a minimum of *4' for Climate Zone 4A*.
- Insulation extending away from the building must be protected by pavement or by minimum 10" of soil.

Insulation at Tenant Separation Walls

Fire-separated walls between dwelling units in two-family houses or townhouses must be insulated at a minimum R-value of R-10. *R402.4.6*

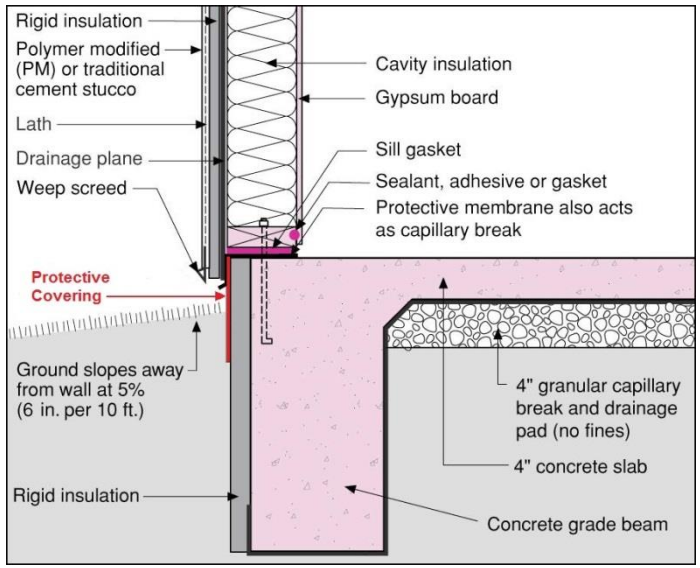


Figure BE-16.a.
Protection of Insulation Over the Grade Beam
Source: basc.pnnl.gov/images

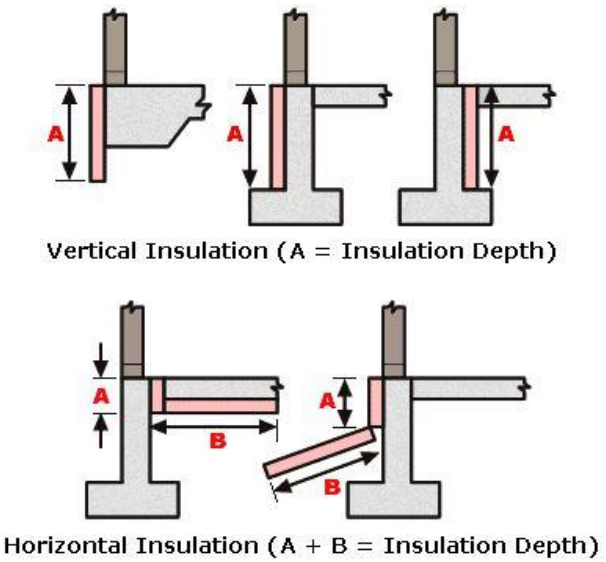


Figure BE-16.b.
Slab Insulation Methods
Source: basc.pnnl.gov/images

RESIDENTIAL BUILDING ENVELOPE

Insulation in Ceilings

- **Ceiling with Attic Spaces:** Minimum R-49; or *Uncompressed R-38* covering 100% of ceiling and extended over the wall top plate at the eaves (See Figures below). *R402.2.1 R402.2.2*
- **Ceiling without Attic Spaces:** When installation of required minimum R-49 insulation in 100% of the ceiling is unachievable, R-30 insulation is allowed for a maximum 500 sf or maximum 20% of the total insulated ceiling area, whichever is less. If partial R-30 insulation is proposed, provide roof area calculations with roof plan diagrams.

Access Hatches and Doors

Access doors to unconditioned spaces such as attics and crawl spaces must be weatherstripped and insulated to a level equivalent to the insulation on the surrounding surfaces (e.g., adjacent ceiling surface). *R402.2.4*

Sunroom Insulation and Fenestration

- Sunrooms enclosing conditioned space must meet the Residential building envelope insulation and fenestration requirements. *R402.2.13 R402.3.5*
- Sunrooms *with thermal isolation* and enclosing conditioned space must meet the following insulation and fenestration requirements:
  - **Ceiling Insulation**: Min. R-19
  - **Wall Insulation**: Min. R-13
  - **Vertical Fenestration**: Max. U-0.45
  - **Skylight**: Max. U-0.70
- Conditioned space *with thermal isolation* must be controlled as a separate zone for heating and cooling, or conditioned by separate equipment.

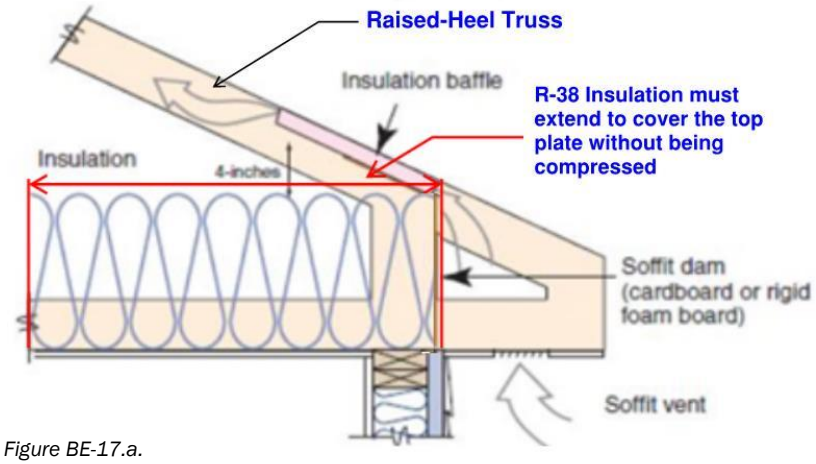


Figure BE-17.a.
Raised-Heel Truss (achieving Energy Truss)
Source: basc.pnnl.gov/images

Figure BE-17.b.
Access Hatch Properly Insulated
Source: basc.pnnl.gov/images

ADDITIONAL ENVELOPE REQUIREMENTS – ENERGY MODELED JOBS PER ASHRAE SECTION 11 OR APPENDIX G

For new buildings ≥ 25,000 sf and Energy-modeled per the Energy Cost Budget Method (Section 11) or the Performance Rating Method (Appendix G), the building envelope must satisfy one of the following compliance options. *1RCNY §5000-01 (f)*

▪ Prescriptive Compliance - Section 5.5, "Prescriptive Building Envelope Option" *5.2.3.a*

- All building envelope components in the Architectural Plans must demonstrate compliance with Section 5.5.
- **Tabular analysis** must be submitted in an EN- sheet listing both proposed envelope thermal performance values and code-prescriptive values of the entire building envelope components.

▪ Envelope Performance Factor Compliance *5.2.3.b*

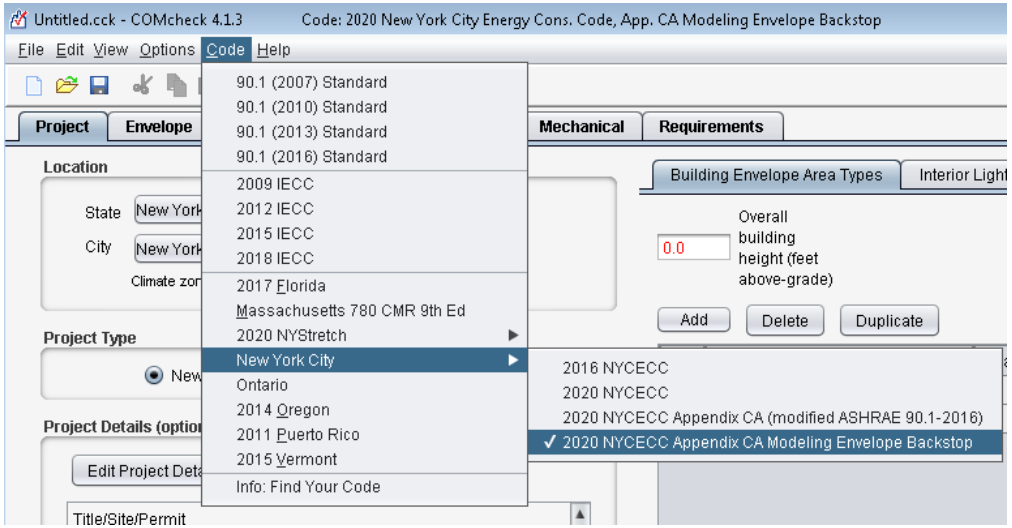
- The proposed building's Envelope Performance Factor in accordance with Appendix C of ASHRAE must be calculated through **COMcheck** Envelope energy analysis.
- To demonstrate compliance, the COMcheck Envelope report must indicate that:

  a) For **Multifamily**, hotel/motel and dormitory building types:
  The proposed envelope design does not exceed the allowable margin of **- 15%** in the performance factor.

  b) For all **Other** building types:
  The proposed envelope design does not exceed the allowable margin of **- 7%** in the performance factor.

  c) For **Mixed-Use** building types:
  The proposed envelope design does not exceed the allowable margin, determined from the area-weighted average of the gross wall area, auto-calculated by COMcheck.

- To start this **COMcheck** Envelope analysis, choose '2020 NYCECC Appendix CA Modeling Envelope Backstop" under the Code tab.



- *Example of COMcheck Envelope analysis results appearing in the compliance bar at the bottom of the analysis:*

  "Qualifies for 2020 NYCECC, App. CA Modeling: Envelope design -12% (allowable margin = -15.0%)" or

  "Qualifies for 2020 NYCECC, App. CA Modeling: Envelope design -3% (allowable margin = -11.4%)" or

  "FAILS to qualify for 2020 NYCECC, App. CA Modeling: Envelope design -16% (allowable margin = -15.0%)": Note that this is NOT Compliant.

How-to Guide:
Supporting Documentation

In Compliance with

2020 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 2020 NYCECC; 2) Not to replace or represent the entire 2020 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 2020 NYCECC and related regulations of the City of New York and the Department of Buildings.

OPTIMAL EQUIPMENT SIZE

Residential Buildings

- **Equipment Sizing per ACCA Manual S**: Heating and Cooling equipment of a Residential job application must be sized in accordance with ACCA Manual S based on building loads calculated per ACCA Manual J, or other approved calculation methodologies. *R403.7*
- **Sizing Statement:** The drawings must include a statement indicating the total Heating and Cooling design loads have been determined as such.
- **Duct Sizing per ACCA Manual D:** Ducts in a Residential job application must be sized in accordance with ACCA Manual D.
- **Minimum Efficiency:** New or replacement heating and cooling equipment must meet or exceed the minimum efficiency rating required by Federal law. *R403.3.8*

Commercial Buildings

- **ANSI/ASHRAE/ACCA Standard 183:** Design loads associated with Heating, Ventilating and Air Conditioning (HVAC) of a Commercial job application must be determined in accordance with ANSI/ASHRAE/ACCA Standard 183, or by an approved equivalent computational method. *C403.1.1 C403.3.1 6.4.2.1*
- **Sizing Statement:** The drawings, preferably in an EN- labeled sheet, must include a statement indicating the total HVAC design loads have been determined as such.
- **Design loads and System Commissioning:** Total HVAC design loads combined with Service Water Heating loads of a job application largely dictate whether System Commissioning (per Section C408 and Section 6.7.2.3) on the job is required or not. Refer to [OR-8] for the detailed requirements for System Commissioning.

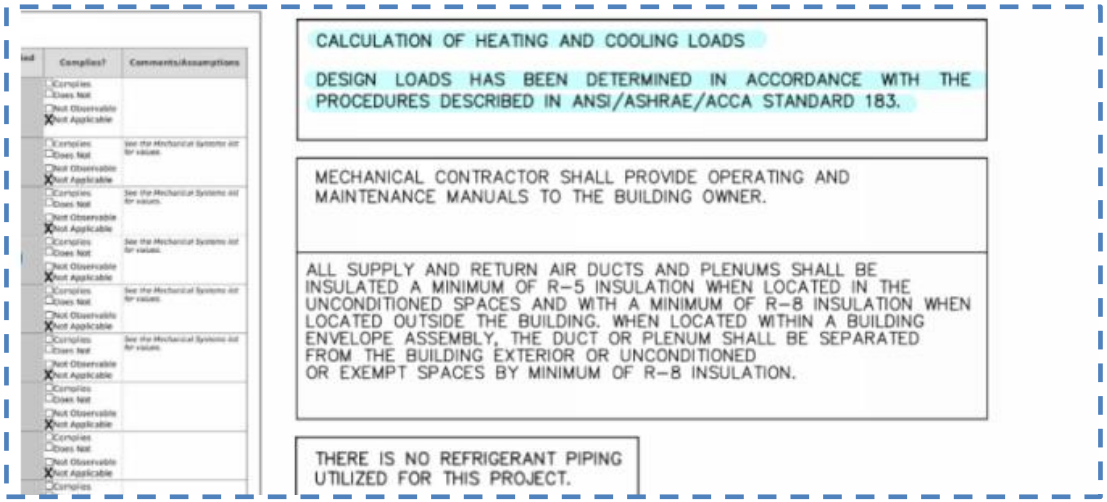


Figure MS-1. ***Sample Sizing Statement***

- *For definitions of "Residential Building" and "Commercial Building," refer to R202 & C202.*

MINIMUM EQUIPMENT EFFICIENCY/PERFORMANCE

Complete Equipment Specifications

For all proposed HVAC and Service Water Heating (SWH) equipment, the equipment schedule on construction drawings must clearly list the *equipment efficiency* or performance rating along with the type, size, capacity, and fuel type of all equipment, and any additional specifications pertaining to the energy use of the equipment. For all Energy-Code-regulated equipment, their rated efficiency/performance ratings identified in the equipment schedule must meet or exceed the corresponding Code-prescribed value.

R403.7
C403.3.2
C404.2
6.4.1

Values on Construction Drawings First, and then on Energy Analysis

Values and descriptions for HVAC and SWH equipment reported on Energy Analysis (on EN- labeled sheets) must be quoted from those in the equipment schedules and specifications on the relevant construction drawings–e.g., M- , or P- labeled drawings.

1 RCNY §5000-01 (f),(g)

SPLIT SYSTEM AIR CONDITIONING SCHEDULE "A"

MARK	AREA SERVED	TON	OUTDOOR MODEL#	INDOOR MODEL#	COOLING CAPACITY RATED CAPACITY BTUH	HEATING CAPACITY RATED CAPACITY (BTUH) @ 47 F	@ 17 F	POWER SUPPLY	INDOOR UNIT MCA (A)	MO
CU-C-1 AHU-C-1	UNIT # 1	4 T.	XXXX-XXXXXX	XXXX-XXXXX	47,500	52,500	38,000	20		

OUTDOOR UNIT			EER	SEER	HSPF	COP @
IND PRESSURE TEL	WEIGHT (LBS)	EXTERNAL DIMENSIONS (H x W x D)				
58 dB	283	52-15/16X35-7/16X12-5/8	--	14.40	8.8	2.6

COMcheck Software Version 4.1.3.0

Mechanical Compliance Certificate

Energy Code:	2020 New York City Energy Conservation Code
Project Title:	New Multifamily Building
Location:	New York, New York
Climate Zone:	4a
Project Type:	New Construction

Additional Efficiency Package(s)

Reduced interior lighting power. Requirements are implicitly enforced within interior lighting allowance calculations.

Mechanical Systems List

Quantity	System Type & Description
1	HVAC System_CU-C-1 (Single Zone): Split System Heat Pump Heating Mode: Capacity = 53 kBtu/h, Proposed Efficiency = 8.80 HSPF, Required Efficiency = 8.20 HSPF Cooling Mode: Capacity = 48 kBtu/h, Proposed Efficiency = 14.40 SEER, Required Efficiency: 14.00 SEER Fan System: AHU-C-1 | 1ST FLOOR -- Compliance (Motor nameplate HP method) : Passes Fans: AHUC1 Supply, Single-Zone VAV, 1307 CFM, 0.5 motor nameplate hp, 0.7 fan efficiency grade

Figure MS-2.
Sample Mechanical Equipment Schedules & Matching Mechanical COMcheck Report - SPLIT SYSTEM HEAT PUMP

- *Efficiency value of individual equipment should be listed in the same measurement unit prescribed in the corresponding efficiency requirements table in the Code.*

AIR COOLED CONDENSING UNIT SCHEDULE

UNIT NO.	SERVICE	LOCATION	NOMINAL COOLING CAPACITY,TON	NOMINAL HEATING CAPACITY,BTU	ELECTRICAL DATA MCA / MFS	VOLTS	PH	MANUFACTURER AND MODEL No.	IEER/EER	CODE REQUIRED EFFICIENCY EER	COP	CODE REQUIRED EFFICIENCY COP	WEIGHT LBS	REMARKS
ACCU-L-1	LOBBY	ROOF-BLDG. B	10	135,000	46 / 1 @ 60	208	3	XXXXX- XXXXXXX	24.4/12.7	11.0	3.84	3.3	765	HEAT PUMP

AIR HANDLING UNIT SCHEDULE

UNIT NO.	SERVICE	LOCATION	CFM	O.A. CFM	EXT.S.P. IN.W.C.	NOMINAL COOLING CAPACITY TON	NOMINAL HEATING CAPACITY BTU/HR	POWER CONSUM. COOL/HEAT WATTS	ELECTRICAL DATA MCA AMPS	MFA AMPS	VOLTS	PH	WEIGHT (LBS)	MANUFACTURER AND MODEL	REMARKS	AIR COOLED CONDENSING UNIT SERVED
AC-L-1	LOBBY	1ST FLOOR	1200	-	0.8	4	54,000	259	5.3	15	208	1	106	XXXX- XXXXXX	CEILING TYPE DUCTED	ACCU-L-1
AC-L-2	LOBBY	1ST FLOOR	800	-	-	2.5	34,000	57	0.9	15	208	1	57	XXXX- XXXXXX	4 WAY CASSETTE	

COMcheck Software Version 4.1.3.0

Mechanical Compliance Certificate

Energy Code: 2020 New York City Energy Conservation Code
Project Title: New Multifamily Building
Location: New York, New York
Climate Zone: 4a
Project Type: New Construction

Additional Efficiency Package(s)

Reduced interior lighting power. Requirements are implicitly enforced within interior lighting allowance calculations.

Mechanical Systems List

Quantity **System Type & Description**

1 ACCU-L-1 (Single Zone):
VRF Condensing Unit, Air Cooled Heat Pump
Heating Mode: Capacity = 135 kBtu/h,
Proposed Efficiency = 3.84 COP, Required Efficiency = 3.30 COP
Cooling Mode: Capacity = 120 kBtu/h,
Proposed Efficiency = 12.70 EER, Required Efficiency: 11.00 EER + 14.6 IEER
Fan System: None

1 AC-L-1 (Single Zone):
Cooling: 1 each - VRF Zone Fan Unit, Capacity = 48 kBtu/h, No Economizer, Economizer exception: Low Capacity Residential
No minimum efficiency requirement applies
Fan System: Unspecified

2 AC-L-2 (Single Zone):
Cooling: 1 each - VRF Zone Fan Unit, Capacity = 30 kBtu/h, No Economizer, Economizer exception: Low Capacity Residential
No minimum efficiency requirement applies
Fan System: Unspecified

Figure MS-3.
Sample Mechanical Equipment Schedules & Matching Mechanical COMcheck Report
- VRF HEAT PUMP :
AIR-COOLED CONDENSER & ZONED FAN UNITS

GAS-FIRED, COMMERCIAL, HOT WATER HEATER

ID	MANUFACTURER AND MODEL NUMBER	LOCATION	TYPE	INPUT (MBH)	EFFICENCY	GALLON CAPACITY	RECOVERY CAPACITY (GPH) AT 100 F RISE	WEIGHT	NOTES
HWH-1	OOOOO BTH-300 MXI	ROOF / HOT WATER HEATER RM.	DIRECT VENT	300	98%	119	698	825	PROVIDE NEUTRALIZING DEVICE ON CONDENSATE DRAIN LINE
HWH-2	OOOOO BTH-300 MXI	ROOF / HOT WATER HEATER RM.	DIRECT VENT	300	98%	119	698	825	

COMcheck Software Version 4.1.3.0

Mechanical Compliance Certificate

Energy Code:	2020 New York City Energy Conservation Code
Project Title:	New Multifamily Building
Location:	New York, New York
Climate Zone:	4a
Project Type:	New Construction

Construction Site: Owner/Agent: Designer/Contractor:

Additional Efficiency Package(s)

Reduced interior lighting power. Requirements are implicitly enforced within interior lighting allowance calculations.

Mechanical Systems List

Quantity **System Type & Description**

2 HWH-1 & 2:

Gas Storage Water Heater, Capacity: 119 gallons, Input Rating: 300 kBtu/h w/ Circulation Pump
Proposed Efficiency: 98.00 % Et, Required Efficiency: 80.00 % Et

Figure MS-4.
Sample Mechanical Equipment Schedules & Matching Mechanical COMcheck Report
- SERVICE WATER HEATING:
GAS FIRED STORAGE WATER HEATER

RESIDENTIAL-BUILDING-SPECIFIC REQUIREMENTS

The relevant construction drawings (e.g., M- , P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

Systems for Multiple Dwelling Units

- **Systems serving** multiple dwelling units must comply with Sections C403 and C404 (Commercial Buildings section) of ECC in lieu of Section R403. *R403.8 R408*

Controls

- **Programmable Thermostat:** At least one thermostat for each separate heating and cooling system must be provided with controls, setback capabilities and temperature set points prescribed by this section of the Code. *R403.1.1 R403.1.2 R403.2*
- **Heat Pump Supplementary Heat:** Heat pumps having supplementary electric-resistance heat must have controls that prevent unnecessary supplemental heat operation.
- **Outdoor Temperature Setback for Hot Water Boilers:** Hot water boilers that supply heat to the building through one- or two-pipe heating systems must have an outdoor setback control.

Duct & Piping Insulation

- Duct system in new buildings and additions must be specified to be located in conditioned space. *R403.3.1 R403.3.7*
- Duct system in alterations must satisfy minimum R-values listed in R403.3.1 depending on the location of ducts.
- For heating/cooling system pipes carrying fluids > 105°F, or < 60°F, drawings must specify the pipe insulation thickness in accordance with Table R403.4. The thickness and conductivity of the piping insulation must result in R-3 or greater.

Duct Leakage Testing

- Duct system where the Leakage Testing is required, drawings must include a statement specifying that duct leakage testing shall be performed at either Rough-in, or Post-construction, and the leakage shall be ≤ 4 cfm/100 sf of conditioned floor area. *R403.3.3 R403.3.4*

RESIDENTIAL-BUILDING-SPECIFIC REQUIREMENTS

The relevant construction drawings (e.g., M- , P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

Service Water Heating

- **Heat Trace Temperature Control:** Any electric heat trace systems must be provided with controls that automatically adjust the energy input to the heat tracing to maintain the desired water temperature in response to the occupant's hot water use. *R403.5.1*
- **Demand Recirculation Systems:** Any *circulation pump* must be equipped *with controls* that automatically start/turn off the pump in response to the hot water demand and water temperature in the system. *R403.5.2 R403.5.3 R403.5.5*
- **Insulation:** Hot water pipes must be insulated with a minimum thermal resistance value of R-3.
- **Supply of Heated Water:** Service hot water supply piping must be designed in accordance of with one of the following:
  (a) Maximum allowable pipe length method
  (b) Maximum allowable pipe volume method
  (c) Drain water heat recovery units
  (d) Recirculation systems

Ventilation

- **Dampers:** Outdoor air intakes and exhausts must have *automatic or gravity* dampers that close when the ventilation system is not operating. *R403.6*
- **Fan Efficacy:** Fans used to provide whole-house mechanical ventilation must meet or exceed the minimum system efficacies of Table R403.6.1. *R403.6.1*
- **Ventilation System Design:** *R403.6.2*

  In new Residential buildings, 'exhaust-only' ventilation is No Longer accepted for energy code compliance.

  Instead, ventilation system of every dwelling unit must be designed with:

  (a) Supply and exhaust ventilation with heat recovery ventilator (**HRV**) or energy recovery ventilator (**ERV**), Or
  (b) Balanced ventilation system satisfying air flow rates of Table R403.6.2(1), and fan capacities adjusted per Table R403.6.2(2).

HVAC System Controls

The relevant construction drawings (e.g., M- , P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

Thermostatic Controls

C403.4.1
6.4.3.1
6.4.3.2

- All mandatory thermostatic controls applicable to the proposed system must be specified on drawings.
- The required controls include:
  1) Heat pump supplementary heat controls
  2) Minimum 5°F Deadband
  3) Setpoint overlap restriction.
  Note that many programmable thermostats meet this requirement.

Off-Hour Controls

C403.4.2
6.4.3.3

Thermostatic setback controls that are controlled by either an automatic time clock or programmable control system must be provided in each zone.

Narratives on Operations and Controls

1 RCNY §5000-01 (g)(2)

A narrative must be provided for each mandatory control system describing its function and operation and specifying proper setpoints of equipment and controls.

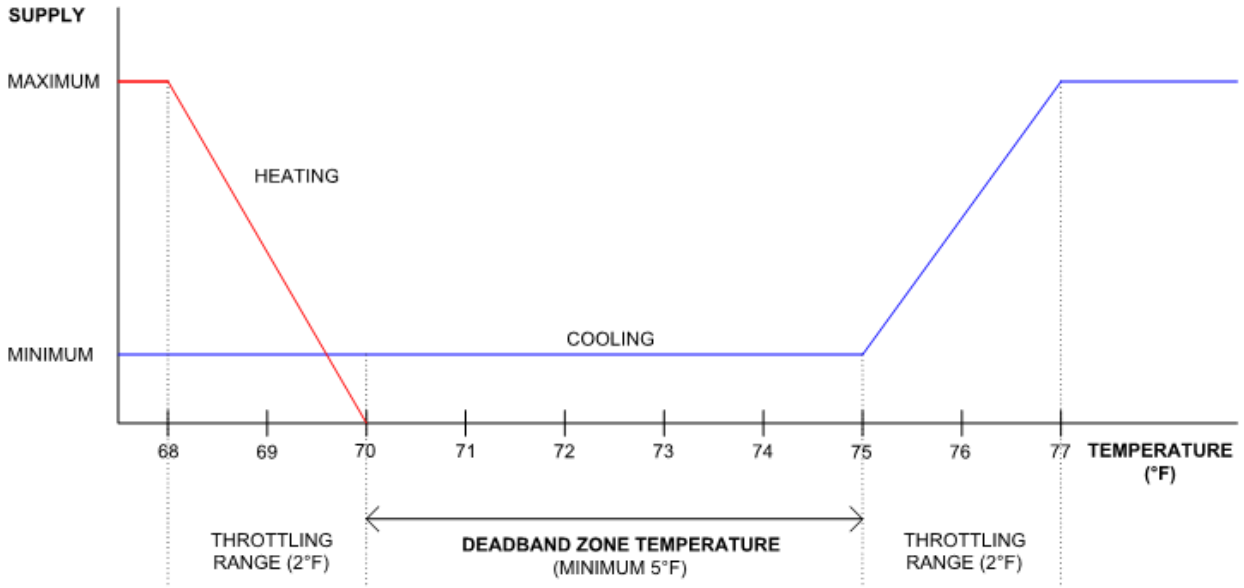


Figure MS-7.
Sample Deadband Control Setup

ECONOMIZERS

The relevant construction drawings (e.g., M- , P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

Requirement for Each Cooling System

C403.5
6.5.1

- Most commercial buildings have spaces that need cooling all year long. If it is colder outside than inside, economizers provide "free cooling" by bringing in the outdoor air to cool the space in lieu of activating mechanical cooling equipment.
- Air or water economizer must be provided on individual fan-cooling units **≥ 270 kBtu/h for Group R** occupancies, and **≥ 54 kBtu/h for all other** occupancies
- For **ECC-following jobs**:
  - Even if each fan cooling unit serving **Group R** occupancies is < 270 kBtu/h, the total supply capacity of all fan cooling units not provided with economizers must be ≤ 20 % of the total supply capacity, or **1,500 kBtu/h**, whichever is greater.
  - Even if each fan cooling unit serving **all other** occupancies is < 54 kBtu/h, the total supply capacity of all fan cooling units not provided with economizers must be ≤ 20 % of the total supply capacity, or **300 kBtu/h**, whichever is greater.

  NOTE: For split systems or VRF systems, the indoor cooling unit capacity must be used to calculate the total supply capacity.

High-Efficiency Exemption

Table C403.5(2)
Table 6.5.1-2

- **ECC**-following jobs: Individual cooling systems with minimum **20%** efficiency improvement (IPLV or EER) are exempt from providing economizers.
- **ASHRAE**-following jobs: Individual cooling systems with minimum **42%** efficiency improvement (IPLV, IEER, SEER, or alternatively EER) are exempt from providing economizers.

Cooling Stage Requirements

C403.5.1

Cooling systems with economizers are required to have two-, three- or four-stage cooling, depending on the size of the cooling system. The economizers are required to provide partial cooling even if the outdoor air is not cool enough to satisfy the entire cooling load.

High-Limit Shutoff

C403.5.3.3
6.5.1.1.3

Economizers in lieu of mechanical cooling can save energy significantly when the outdoor air is cool and has low humidity. The Code sets the temperature and enthalpy limits when economizers are to shut off; these high-limit shutoffs must be noted in the construction documents.

Economizer Fault Detection and Diagnostics (FDD)

C403.5.5
6.4.3.12

Systems equipped with an economizer must include a *fault detection and diagnostics* (FDD) system equipped with specific sensors that detect and reports faults.

VENTILATION

The relevant construction drawings (e.g., M- , P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

Demand Controlled Ventilation (DCV)

For spaces larger than 500 sf and with an average occupant load of at least 25 people/1,000 sf of floor area, *demand control ventilation* (DCV) must be specified. For the average occupant load, Table 403.3 of NYC Mechanical Code must be referenced. See Figure below for example.

C403.7.1
6.4.3.8

Energy Recovery Ventilation Systems (ERV)

C403.7.4
6.5.6.1

- Each fan system operating < 8,000 hours/yr, where the supply airflow rate exceeds the values in Table C403.7.4(1) [for ECC-following jobs], or values in Table 6.5.6.1-1 [for ASHRAE-following jobs], exhaust air energy recovery ventilation (ERV) system is required.
- Each fan system operating ≥ 8,000 hours/yr, where the supply airflow rate exceeds the values in Table C403.7.4(2) [for ECC-following jobs], or values in Table 6.5.6.1-2 [for ASHRAE-following jobs], exhaust air energy recovery ventilation (ERV) system is required.
- The ERV operation must demonstrate a minimum total (sensible and latent) recovery effectiveness ratio of 50%, and be provided with controls that communicate with air economizer operation. This must be identified in the equipment schedule and controls notes.
- Where the sum of the airflow rates exhausted within 30 feet of each other is ≥75 % of the design ventilation outdoor air flow rate, an ERV is required.

TABLE 403.3
MINIMUM VENTILATION RATES

OCCUPANCY CLASSIFICATION	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE CFM/PERSON	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE R_a CFM/FT^{2a}	DEFAULT OCCUPANT DENSITY #/1000 FT^{2a}	EXHAUST AIRFLOW RATE CFM/FT^{2a}
Education				
Auditoriums	5	0.06	150	—
Corridors (see public spaces)	—	—	—	—
Media center	10	0.12	25	—
Lecture hall (fixed seats)	7.5	0.06	150	—
Art classroom	10	0.18	20	0.7
Science laboratories[g, k]	10	0.18	25	1.0
Offices				
Conference rooms	5	0.06	50	—
Office spaces	5	0.06	5	—
Reception areas	5	0.06	30	—
Telephone/data entry	5	0.06	60	—

Figure MS-9.
Excerpt from Table 403.3 of 2014 NYC Mechanical Code Chapter 4

FAN CONTROLS

The relevant construction drawings (e.g., M- , P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

VAV System Controls for Multiple Zones

Supply air systems serving multiple zones must be *variable air volume* (VAV) systems that, during periods of occupancy, are capable of being controlled to reduce primary air supply before reheating, re-cooling or mixing.

C403.6
6.5.3.3

Fan Airflow Control

- Direct expansion (DX) cooling systems ≥ 65 kBtu/h must have a minimum of two stages of fan speed control. For example, variable speed drive (VSD) or variable frequency drive (VFD) must be specified in the equipment schedule for these systems.
- Chilled-water and evaporative cooling systems with fan motor power ≥ 1/4 hp must also have a minimum of two stages of fan speed control.

C403.8.5.1
6.5.3.2.1

Fan Motor Power Limitation

- Drawings must indicate (ideally in the Fan Schedule) that each individual fan system power in the HVAC system does not exceed the allowable fan system *motor nameplate horsepower* (Option 1), *or* fan system *brake horsepower* (Option 2).
- The fan brake horsepower for each fan listed on the schedule must be ≤ the first available motor size greater than the hp value calculated per Section C403.8.2.

C403.8.1
C403.8.2
6.5.3.1.1
6.5.3.1.2

Fan Efficiency

- Fans with a motor nameplate horsepower > 5 hp must be designed to have a *fan efficiency grade* (FEG) ≥ 67.
- The total efficiency of the fan at the design point of operation must be within 15 percentage points of the maximum total efficiency of the fan.

C403.8.3
6.5.3.1.3

Boiler Controls

The relevant construction drawings (e.g., M- , P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

Outdoor Temperature Setback Control

For one- or two-pipe systems, drawings must specify setback controls that automatically lower the boiler water temperature based on the outdoor air temperature.

C403.4.1.5

Hot-Water Temperature Reset Controls

Hot water systems with design output capacity ≥ 300 kBtu/h must be provided with automatic controls to reset supply water temperatures by representative building loads or outdoor air temperature.

C403.4.4
6.5.4.4

Modulating Burner

Hot water systems of a single boiler with input design capacity > 500 kBtu/h must be equipped with either a multi-staged or *modulating burner*.

C403.4.3

Boiler Turndown

- A single boiler or boiler systems ≥ 1,000 kBtu/h must have a turndown ratio of 3 to 1, 4 to 1, or 5 to 1, as defined by the Code.
- The turndown ratio may be met by a single boiler, modulating boilers or a combination of the two.

C403.3.4
6.5.4.1

Condensing Boilers

For space heating gas-fired condensing boilers with rated thermal efficiency (E_t) of ≥ 90%, the distribution system must be designed so that the hot water return temperature (entering water temperature) is ≤ 120°F, when the boiler is firing.

C403.3.5
6.4.1.6

HEAT REJECTION CONTROLS

The relevant construction drawings (e.g., M- , P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

Heat Rejection Fan Power

Heat rejection fans with motors ≥ 7.5 hp must be equipped with controls to reduce the fan power to operate the fan at two-thirds of full speed or less.

C403.9.1
6.5.5.2

Multiple-Cell Cooling Towers

Heat rejection systems with multiple cells and equipped with VFD (variable frequency drive) controls must be operated in sequence as described in Section C403.9.2.

C403.9.2

Cooling Tower Flow Turndown

Heat rejection systems operating with water-cooled chillers and configured with VFD condenser water pumps must be designed so that all open-circuit cooling tower cells are capable of running in parallel with sequencing as provided by the Code.

C403.9.4
6.5.5.4

Chiller Controls

The relevant construction drawings (e.g., M- , P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

Chilled-Water Temperature Reset Controls

Chilled water systems with a design output capacity ≥ 300 kBtu/h must be provided with automatic controls to reset supply water temperatures by representative building loads or outdoor air temperature.

C403.4.4
6.5.4.4

Supply Temperature Reset and Deadband

Hydronic systems of heating fluids that have been previously mechanically cooled, and hydronic systems of cooling fluids that have been previously mechanically heated, must be provided with supply temperature reset controls and/or a supply temperature deadband between changeovers based on the system type.

C403.4.3.3.1
6.5.2.2

Chiller Isolation

- A chilled-water plant including more than one chiller must be configured so that all fluid flow through the chiller is automatically reduced or shut off when the chiller is shut down.
- A boiler plant including more than one boiler must be configured so that the flow through the boiler is automatically reduced or shut off when the boiler is shut down.

C403.4.5
6.5.4.3

ADDITIONAL HVAC CONTROLS

The relevant construction drawings (e.g., M- , P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

Shutoff Dampers

- Class-I *motorized* shutoff dampers with a maximum air leakage rate of 4 cfm/ft² at 1.0 inch water gauge must be provided in outdoor air intakes, exhaust openings, and stairway/shaft vents. Alternatively, where permitted by the Code, *gravity* (non-motorized) dampers may be provided in lieu of motorized dampers. *C403.7.7 6.4.3.4.2*
- Alternatively, *gravity* (non-motorized) dampers may be provided in lieu of motorized dampers in buildings less than 3-stories above grade plane, or where the design exhaust capacity is ≤ 300 cfm. – *Only* when following NYCECC.
- See Section 6.4.3.4.2 for exceptions where non-motorized dampers are permitted when following ASHRAE.

Enclosed Parking Garage Ventilation

Enclosed parking garage ventilation systems must have capacity to monitor contaminant (CO) levels and automatically throttle the fan power in response to the contaminant levels. *C403.7.2 6.4.3.4.5*

Pump Controls: Hydronic Variable Flow Systems

- HVAC pumping systems with 3 or more modulating control valves must be designed for variable fluid flow, and be capable of reducing pump flow rates to no more than the larger of 25% of the design flow rate or the minimum flow required by the heating/cooling equipment manufacturer for the proper operation of equipment. *6.5.4.2*
- Individual chilled-water pumps serving variable-flow systems having motors ≥ 5 hp must have controls or devices (such as variable-speed controls) that will result in pump motor demand of a maximum 30% of design wattage at 50% of design water flow.

Hot Gas Bypass Limitation

- Cooling systems must not use hot gas bypass or other evaporator pressure control systems unless the system is designed with multiple steps of unloading or continuous capacity modulation. *C403.3.3 6.5.9*
- The capacity of the hot gas bypass, when permitted by Code, must be limited to:
  - For ECC-followings jobs, maximum 50% of the total capacity for the rated capacity ≤ 240 kBtu/h; and maximum 25% for the rated capacity > 240 kBtu/h.
  - For ASHRAE-following jobs, maximum 15% of the total capacity for the rated capacity ≤ 240 kBtu/h; and maximum 10% for the rated capacity > 240 kBtu/h.

Vestibule Heating/ Cooling

- The heating system must be provided with controls to shut off the source when the outdoor temperature is > 45°F. *C403.4.1.4 6.4.3.9*
- The heating and cooling systems must have a thermostat in the vestibule to limit heating to ≤ 60°F and cooling to ≥ 85°F.

SERVICE WATER HEATING SYSTEMS

The relevant construction drawings (e.g., M- , P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

Heat Traps

For water-heating equipment not supplied with integral heat traps and serving non-circulating systems, heat traps must be specified on *both supply and discharge* piping associated with the heating equipment.

C404.3
7.4.6

Circulation Pumps and Heat Trace Systems

- Heated-water circulation systems must be provided with circulation pumps that are automatically turned on and off by the hot water demand in the system.
- Electric heat trace systems must have controls to automatically adjust the energy input to maintain the desired water temperature in the piping, and to be automatically turned off when there is no hot water demand.

C404.6
7.4.4.2

Heat Recovery for Service Water Heating

Condenser heat recovery system must be installed for facilities as follows:

1) operating 24 hours/day,
2) the total installed heat capacity of water-cooled systems > 6,000 kBtu/h of heat rejection, *and*
3) the total design service water heating load > 1,000 kBtu/h.

C403.9.5
6.5.6.2.1

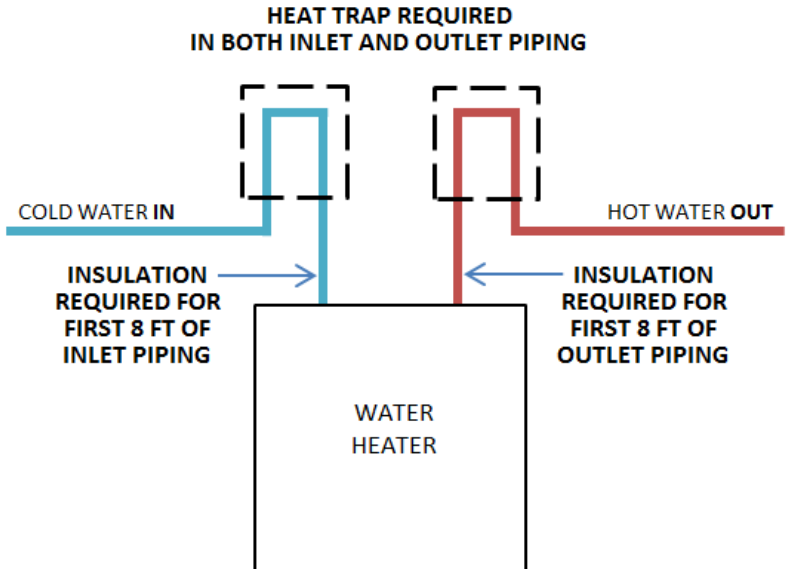


Figure MS-15.
Heat Traps and Insulation Requirements for Non-Circulating Systems

DUCTS AND PIPING

The relevant construction drawings (e.g., M- , P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

Duct and Plenum Insulation

Supply and return air ducts and plenums must be designed as follows:

C403.11.1
6.4.4.1.2

Location	Requirement
- *In Unconditioned* space	Insulated with min. R-6 insulation
- *Outside* the building	Insulated with min. R-8 insulation
- *Within a building envelope* assembly	Separated from the building exterior or unconditioned space by min. R-8 insulation

Duct System Sealing

C403.11.2
6.4.4.2.1

- Joints, seams and connections of ducts, air handlers, and filter boxes must be sealed.
- Drawings must clearly indicate pressure classifications of the proposed duct systems in accordance with NYC Mechanical Code.
- For high-pressure duct systems that operate at a *static pressure > 3 inches water gauge*, drawings must specify the *duct leakage test* requirements in accordance with the SMACNA HVAC Air Duct Leakage Test Manual.

Piping Insulation

C403.11.3
C404.4
6.4.4.1.3

- Piping to service heating, cooling and service water heating systems must be thermally insulated.
- Minimum pipe insulation thicknesses depending on the fluid temperature range must be specified on drawings.

Maximum Pipe Length/Volume

C404.5

Heater water supply piping systems must be designed in accordance with:

a) **Maximum allowable pipe length method**: The piping length from the nearest source of heated water to the terminal fixture is within the maximum allowable pipe length per Table C404.5.1, *or*

b) **Maximum allowable pipe volume method**: The water volume from the nearest source of heated water (i.e., hot water riser) to the terminal fixture is within the maximum allowable pipe volume calculated per C404.5.2.1.

REQUIREMENTS FOR SPECIFIC USE AND FUNCTION

The relevant construction drawings (e.g., M- , P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

Radiant Heating for Outside

- Systems to provide heat outside the building thermal envelope must be radiant systems, e.g., electrical unit heaters in parking garage
- The heating systems must be controlled by an occupancy sensing device or timer switch.

C403.12.1
6.5.8.1

Hotel Guest Rooms

In each guestroom in hotels and motels (all Group R-1 buildings) with greater than 50 guestrooms, temperature setpoint controls and ventilation controls during unoccupied hours, and/or a captive key card system must be provided.

C403.7.6
6.4.3.3.5

Refrigeration & Commercial Kitchen Equipment and System

Refrigeration equipment and systems must be installed and provided in accordance with applicable Code provisions:

- Maximum allowable daily energy use in kWh per equipment type – Section C403.10
- Design of factory-built walk-in coolers/freezers and refrigerated warehouse coolers/freezers – Section C403.10.1
- Design of site-built walk-in coolers/freezers – Section C403.10.2
- Design of site-built refrigerated display cases – Section C403.10.3
- Design of refrigeration systems with remote compressors/condensers not located in a condensing unit – Section C403.10.4
- Commercial kitchen equipment – Section C405.10

C403.10
C405.10
6.5.11
6.8.1
10.4.6

Pools and Spas

Energy use of pools and permanent spas must be controlled by 1) Heaters with readily accessible on-off switch and centrally set thermostat, 2) Time switches that automatically turn on and off heaters and pump motors, and 3) Vapor-retardant cover for outdoor heated pools.

C404.9
C404.10
C408.2
7.4.5

Snow- and Ice-Melt System Controls

Snow- and ice-melting systems must be provided with automatic and/or manual controls capable of shutting off the system in response to the pavement temperature and outdoor weather conditions.

R403.9
C403.12.2
6.4.3.7

Freeze Protection System Controls

Freeze protection systems, such as heat tracing of outdoor piping and heat exchangers, including self-regulating heat tracing, must have controls to automatically shut off the system in response to the outdoor temperature (> 40°F) and the protected fluid conditions.

C403.12.3
6.4.3.7

ASHRAE-Specific Requirements

The relevant construction drawings (e.g., M- , P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

Direct Digital Control (DDC)

DDC controls and display are required for new buildings with chilled-water and hot-water plants ≥ 300 kBtu/h, or fan systems ≥ 10 hp. See Table 6.4.3.10.1 for extensive DDC requirements applicable per building types and system types. *6.4.3.10*

Door Switches

For doors separating conditioned space from the outdoors, controls must be provided to disable or reset mechanical heating and cooling operations within 5 minutes of the door opening. *6.5.10*

Chilled-Water Plant Monitoring

- For electric-motor-driven chilled-water plants in new buildings, or for new plants in existing buildings, devices to measure and monitor the electric energy use and efficiency (in kW/ton) of the chilled-water plant must be installed for: *6.4.3.11*

  a) water-cooled chilled-water plants of > 1,000 tons peak cooling capacity
  b) air-cooled chilled-water plants of > 570 tons peak cooling capacity

- The chiller plant electrical energy use efficiency must be graphically displayed with data trending every 15 minutes.

POST-INSTALLATION DOCUMENTATION

The relevant construction drawings (e.g., M- , P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

Operating and Maintenance Manual

- Drawings must specify that an *operating and maintenance manual* is to be provided to the building owner within 90 days of the issuance of the certificate of occupancy (C/O) or letter of completion.
- The *operating and maintenance manual* must document all HVAC/Service Water Heating equipment and controls, and also Lighting equipment and controls.

R303.3
C408.1.1
C408.2.5.2
4.2.2.3

System Balancing Report

- Drawings must specify that HVAC/SWH systems are required to be tested, adjusted and balanced in accordance with ASHRAE 111 or other approved standards.
- Subsequently, within 90 days of the issuance of the certificate of occupancy or letter of completion, the System Balancing Report describing the completed activities and measurements must be provided to the building owner.

C408.2.2
C408.2.5.3
6.7.2.3.2

Final Commissioning Report

- When System Commissioning is required in accordance with Section C408.2, drawings must specify that a Final Commissioning Report is to be provided to the building owner, and
- The Commissioning Report Certification must be submitted to the Department:
  - **Within 30 months** of the issuance of the C/O or letter of completion for *new buildings ≥ 500,000 sf in conditioned space area*, excluding R-2 occupancies; and
  - **Within 18 months** of the issuance of the C/O or letter of completion for *all other buildings*.
- Refer to 'Other Requirements' section of this How-To Guide, page [OR-8] for further information on the mechanical systems commissioning.

C408.2.5.4
6.7.2.3

Permanent Certificate for Residential Building Equipment

- This requirement applies to all residential buildings and commercial buildings with R-3 occupancy
- Refer to this How-to Guide, page [OR-6]

R401.3
C401.2.1

How-to Guide:
Supporting Documentation

In Compliance with

2020 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 2020 NYCECC; 2) Not to replace or represent the entire 2020 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 2020 NYCECC and related regulations of the City of New York and the Department of Buildings.

INTERIOR LIGHTING POWER

Maximum Allowed Interior Lighting Power

- Light fixture layout plans and light fixture schedules must demonstrate that the proposed interior lighting power density (watts/sf) is not greater than the maximum allowed interior lighting power density. *C405.3 9.2.2.3*
- Light fixture schedules must be complete with the fixture identification key, lamp/fixture type, number of lamps per fixture, fixture wattage, lamp/ fixture efficacy (in lumens/watt), and quantities that match the light fixture layout plans. *1 RCNY §5000-01(g)(3)*
- Light fixture schedules must support the lighting energy analysis report: e.g., *Lamps/Fixture*, *# of Fixtures*, and *Fixture Wattage* listed in Lighting COMcheck report on EN- drawings and must match those values in light fixture schedules on RCP drawings. Refer to the page [GE-3].
- Fixture efficacy values (lumens/watt), and/or fixtures' low-voltage information, when pertaining to exemption of certain lighting power/controls requirements, must also be listed in the light fixture schedules. *R404.1 C405.1 9.1.1*

Allowance Calculation Method

- The maximum allowed interior Lighting Power Density (LPD) must be determined by *either* the Building Area Method, ***or*** the Space-by-Space Method. These may not be used in combination. *C405.3.2 9.2.2*
- The selection of one method between the two, by which the allowed LPD of the job application is determined, must be justified by the building/space programs and work scope of the job application.

Building Area Method

Interior Lighting Power Allowance = The *floor area of each Building area type* x the *LPD value for the Building area type* from Table C405.3.2(1), or Table 9.5.1 *C405.3.2.1 9.2.2.1*

- For the purposes of this method, an 'area' is defined as all contiguous spaces that accommodate or are associated with a single building area type, as listed in Table C405.3.2(1).

LIGHTING FIXTURE SCHEDULE									
Fixture ID	LOCATION	MANUFACTURER/ MODEL	LAMP TYPE	# OF LAMPS/ FIXTURE	FIXTURE WATTAGE (Watt)	*LAMP EFFICACY* (Lumens/Watt)	*FIXTURE EFFICACY* (Lumens/Watt)	TOTAL # OF FIXTURES	NOTES
A1	Apt Foyer	QWERT/ Model-number-LE-1234-5678	LED	1	26	98	---	82	2700K
A2	Apt Bathroom	WERTY/ Model-number-LE-2345-6789	LED	1	35	92	---	126	3000K
C1	Lobby	ERTYU/ Model-number-LE-3456-7890	LED	1	53	---	83	25	6'
C2	Corridor	RTYUI/ Model-number-LE-4567-8901	LED	1	20	---	87	56	4'
B1	Storage	TYUIO/ Model-number-CFL-5678-9012	Compact FL	2	28	91	---	18	14W T5 (2)

Figure LE-1. ***Sample Lighting Fixture Schedule for Residential Building***

INTERIOR LIGHTING POWER

Space-by-Space Method

Interior Lighting Power Allowance = Sum of (the *floor area of each Space type* x the *LPD value for the Space type* from Table C405.3.2(2), or Table 9.6.1)

C405.3.2.2
9.2.2.2

- The space type in the Table that most closely represents the proposed use of each space must be selected so that all spaces in the work scope are accounted for in the calculation.
- Trade-offs among spaces are permitted in this method.

High-Efficacy Lamps or Luminaires

- For *Residential* buildings, also for *Dwelling units within Commercial buildings*, a minimum of **90%** of the permanently installed lighting fixtures must have:
  a) Lamp efficacy ≥ 65 lumens/watt, **or**
  b) Luminaire efficacy ≥ 45 lumens/watt
- To validate the above, light fixture schedules must clearly identify lamp/luminaire efficacy of *each* light fixture, and also lamp/luminaire counts of all lighting fixtures. See Figure LE-1 on the page [LE-1].

R404.1
C405.1
9.4.4

Figure LE-2. ***High-Efficacy Lamp examples***
Source: basc.pnnl.gov

OCCUPANT SENSOR CONTROLS*

Where Required

C405.2.1
Table 9.6.1

- Occupant sensor controls are required in spaces including: classrooms, conference rooms, copy rooms, lounges/ break rooms, enclosed offices, open plan offices, restrooms, storage rooms, locker rooms, warehouse storage areas, janitor closets, corridors/transition areas, cafeteria/fast food dining areas, egress illumination (stairways, exit access), and other spaces ≤ 300 sf.
- Light fixture layout plans, fixture schedules, and the controls narrative must clearly identify the location of occupant-sensor-controlled light fixtures and the connected sensor/control devices.

Occupant Sensor (OS) Control Function (NOT for Open Plan Offices, Cafeteria and Fast Food Dining Areas ≥ 300 sf)

C405.2.1.1
9.4.1.1.b
9.4.1.1.c

- **Automatic-Off:** Drawings must specify that occupant sensor controlled luminaires are *automatically turned off* *within 15 minutes* of all occupants leaving the space.
- **Manual-On or Maximum 50% Automatic-On:** Lights turned off by occupant sensor controls must be either *manually on*, or controlled to be *automatically on maximum 50%* of the lighting power in the space.
- **Manual-On ONLY:** Lights turned off by occupant sensor controls must be *only manually on* – i.e., max. 50% automatic-on is *not* allowed – in the following spaces: classrooms, conference/meeting rooms, employee break rooms, and offices < 200 sf. The sensors and controls in these spaces must *not* have an override switch that converts *from manual-on to automatic-on* functionality.
- **Full Automatic-On:** Only in the following spaces, occupant sensors with full automatic-on are allowed: open plan offices, public corridors, stairways, restrooms, primary building entrance areas and lobbies, and areas where manual-on operation would endanger the safety or security of the building occupants.
- **Manual Control to Turn Off:** Occupant-sensor-controlled luminaires must also be equipped with manual controls that allow occupants to turn lights off.

OS Controls in Open Plan Offices, Cafeteria and Fast Food Dining Areas ≥ 300 sf

C405.2.1.1
C405.2.1.3
9.4.1.1.h

- The maximum control zone area controlled by one (1) occupant sensing device is 600 sf.
- A minimum of 80% of all lighting must be automatically turned off within 15 minutes of all occupants leaving the space.
- Daylight responsive control shall not activate general lighting controls when no occupancy is detected in these spaces.
- See page [LE-4] for required Time-switch and Light-reduction controls.

OS Controls for Egress Illumination

C405.2.1.4
9.4.1.1

- Luminaires servicing Exit access and providing Means of Egress illumination must have controls that automatically reduce the lighting power by 50 % when unoccupied for more than 15 minutes.
- OS with Full Automatic-On of the lighting are allowed
- Means of Egress illumination of < 0.02 watt/sf and the Building-Code-designated Emergency lighting are exempt from this requirement.

***** *For complete controls requirements on ASHRAE 90.1 per space type, refer to Section 9.4.1 and Table 9.6.1.*

TIME-SWITCH & LIGHT-REDUCTION CONTROLS*

Where Required

- Spaces where "Occupant Sensor Control Function" in page [LE-3] are not provided, and
- Open Plan Offices, Cafeteria and Fast Food Dining Areas ≥ 300 sf

C405.2.2

Both Time-switch controls *and* Light-reduction controls must be provided. The controls' function and locations must be clearly specified on drawings.

Time-Switch Controls (Programmed)

C405.2.2.1

Time-switch controls must be designed to:

1) Have a minimum 7-day clock,
2) Allow to program 7-different day types/week,
3) Have an automatic holiday 'shutoff' feature,
4) Have program backup capabilities in case of power interruption, *and*
5) Include a manually-controlled override switch that, when initiated, permits the controlled lighting to remain on for a maximum of 2 hours, and that individually controls a maximum area of 5,000 sf.

Light-Reduction Controls (Manual)

C405.2.2.2

- Spaces with time-switch controls must also be provided with manual light-reduction controls that allow the occupant to reduce the connected lighting load by minimum 50%.
- Light fixture layout plans must clearly indicate the light-reduction control method, the options of which are as follows:
  1) Control of all lamps/luminaires
  2) Dual switching of alternate rows of luminaries
  3) Switching middle lamp luminaires independently
  4) Switching each lamp/luminaire

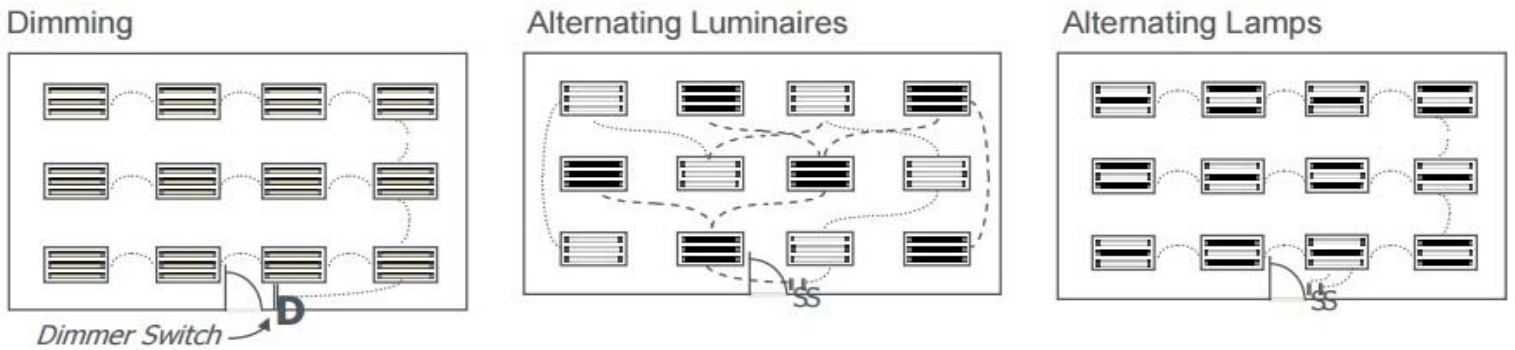


*Figure LE-4. **Light-Reduction Controls Method by***

a) Control of all lamps/luminaires

b) Dual switching of alternate rows of luminaries

c) Switching middle lamp luminaires independently

Source: energycodes.gov

**For complete controls requirements on ASHRAE 90.1 per space type, refer to Section 9.4.1 and Table 9.6.1.*

TIME-SWITCH & LIGHT-REDUCTION CONTROLS*

Where Time-Switch Controls are Exempt

If the spaces listed below are provided *with manual lighting-reduction controls*, time-switch controls are *not* required: *C405.2.2*

1) Sleeping units
2) Spaces where patient care is directly provided
3) Spaces where an automatic shutoff would endanger occupant safety or security
4) Lighting intended for continuous operation
5) Shop and laboratory classrooms

Where Light-Reduction Controls are Exempt

Light reduction controls are *not* required in *daylight zones with daylight responsive controls* complying with Section C405.2.3. *C405.2.2.2*

- *For areas/rooms where exemptions of certain lighting controls are sought, the lighting plans and narratives must provide clear information to satisfy the exemption requirements.*

Figure LE-5.a. ***Patient care area Exempt from Time-Switch Controls***
Source: energy.gov/eere

Figure LE-5.b. ***Daylight zone with automatic controls Exempt from Light-Reduction Controls***
Source: energycodes.gov/training

**For complete controls requirements on ASHRAE 90.1 per space type, refer to Section 9.4.1 and Table 9.6.1.*

DAYLIGHT-RESPONSIVE CONTROLS*

Control Function

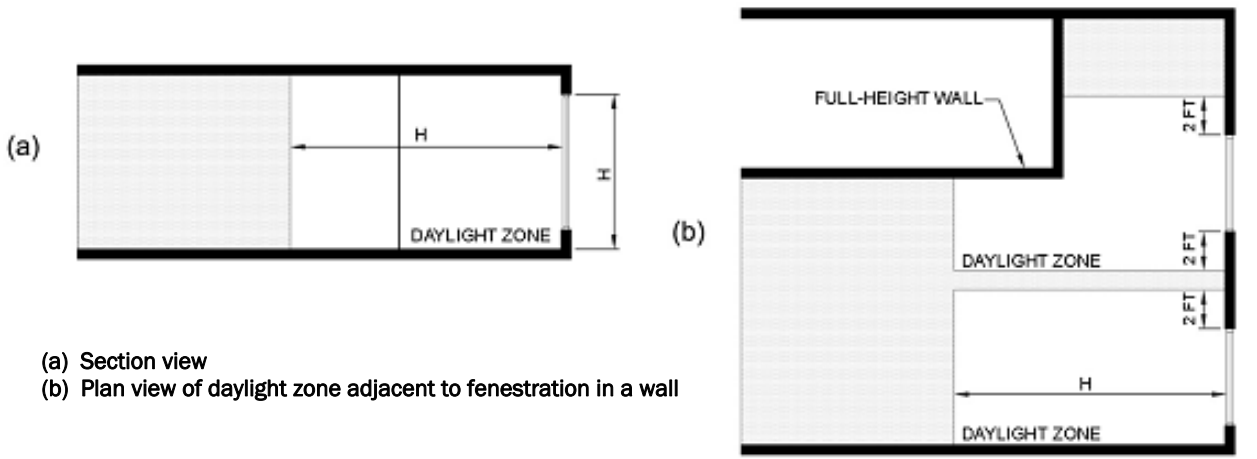
C405.2.3
9.4.1.1.e & f
9.7.2.3

- For spaces having electric lights > 100 watts within daylight zones, independent controls for the lights within daylight zones must be specified.
- For this purpose, light fixture layout plans must clearly *delineate the boundary of each daylight zone*, and indicate separate circuiting and switch control for each zone boundary.
- Daylight-responsive controls must be designed to be capable of a complete shutoff of lights within each daylight zone, and must be installed such that authorized professionals can readily access the controls for calibration.

Sidelit Zone

C405.2.3.2
3.2

- The sidelit zone must be identified on drawings in the floor area *adjacent to vertical fenestration*.
- When the fenestration is located in a wall, the sidelit zone extends:
  (a) Laterally to the nearest full-height wall, or up to 1-times the height from the floor to the top of the fenestration, and
  (b) Longitudinally from the edge of the fenestration to the nearest full-height wall, or up to 2 ft, whichever is less.
- For the criteria of the sidelit zone following ASHRAE, refer to the definition of '*daylight area' in ASHRAE Section 3.2.*



(a) Section view
(b) Plan view of daylight zone adjacent to fenestration in a wall

- *For the Sidelit Zones defined by ASHRAE, i.e., Primary Sidelighted Area and Secondary Sidelighted Area, refer to Figure 3.2-3 and Figure 3.2-4.*

Figure LE-6.
Sidelit Zone

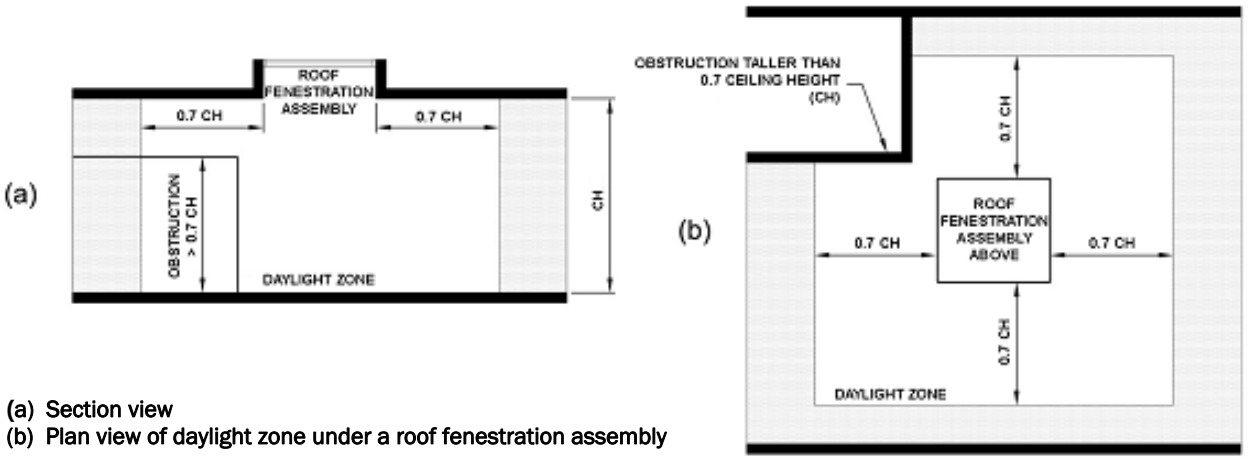
**For complete controls requirements on ASHRAE 90.1, refer to Section 9.4.1 and Table 9.6.1.*

DAYLIGHT-RESPONSIVE CONTROLS*

Toplit Zone

C405.2.3.3
3.2

- The toplit zone must be identified on drawings in the floor area *underneath a roof fenestration assembly.*.
- The toplit zone extends laterally and longitudinally beyond the edge of the roof fenestration assembly:
  (a) To the nearest obstruction that is taller than 0.7-times the ceiling height, or
  (b) Up to 0.7-times the ceiling height, whichever is less.
- For the criteria of the toplit zone following ASHRAE, refer to the definition of '*daylight area' in ASHRAE Section 3.2.*



(a) Section view
(b) Plan view of daylight zone under a roof fenestration assembly

Figure LE-7.
Toplit Zone

- *For the Daylight Zones under Rooftop Monitors following ECC, refer to Figure C405.2.3.3(2) and Figure C405.2.3.3(3).*

- *For the Toplit Zones defined by ASHRAE, i.e., Daylight area under Roof monitors and Daylight area under Skylight, refer to Figure 3.2-1 and Figure 3.2-2.*

**For complete controls requirements on ASHRAE 90.1, refer to Section 9.4.1 and Table 9.6.1.*

EXTERIOR LIGHTING POWER

Maximum Allowed Exterior Lighting Power

C405.4.1
9.4.2

- Light fixture layout plans and light fixture schedules must demonstrate:

  Proposed exterior lighting power density (watts/sf) ≤ Maximum allowed exterior lighting power density

- Light fixture schedules must be complete with fixture identification keys, fixture/lamp type, number of lamps per fixture, and fixture wattages and quantities that match the light fixture layout plans.

Calculation of Maximum Allowance

C405.4.1
1 RCNY §5000-01 (g)(3)(ii)
9.4.2

- The maximum allowed building exterior lighting power must be computed based on Table C405.4.2(2) or Table 9.4.2-2 for the applicable Exterior Lighting Zone per 1 RCNY §5000-01(g)(3)(ii).

Maximum Allowed Exterior Lighting Power	=	Base Site Allowance (per Lighting Zone)	+	Individual Allowance per Area Type (Tradable/Non-Tradable Surfaces)

- Trade-offs are allowed only among exterior lighting applications in the Tradable Surfaces of Table C405.4.2(2), or Table 9.4.2-2.

Lighting Zone 1: Park land
Lighting Zone 2: All R districts, R districts with C overlays and MX districts
Lighting Zone 3: M districts, except MX; C districts, except C5, C6 and C overlays on R districts
Lighting Zone 4: C5 and C6 districts

Exterior Lighting Zone

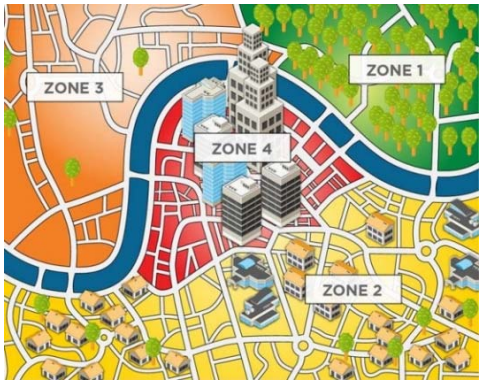


Figure LE-8. ***Exterior Lighting Zone*** *per 1 RCNY §5000-01 (g)(3)(ii)*

Source: energycodes.gov

Exterior Lighting Controls

C405.2.6

See 9.4.1.2, & 9.4.1.4 for ASHRAE

(a) Daylight shutoff: Lights automatically turned off when daylight satisfies the lighting needs

(b) Decorative lighting shutoff: Building façade and landscape lighting automatically shut off within 1 hour of business closing and until 1 hour or less prior to business opening

(c) Lighting setback: For lighting not controlled per the (b) above, controls to automatically reduce the lighting by minimum 50% during 12am - 6am, or from 1-hr after the business closing to 1-hr before opening, or when no activity detected for 15 minutes

(d) Exterior time-switch control function: Controls with 7-different-day-type-programmable clock and automatic holiday setback

(e) Outdoor parking area lighting control: Luminaires of wattage > 78 W and mounted at 24' or less above the ground controlled to automatically reduce the power by minimum 50% when no activity detected for 15 minutes

OTHER LIGHTING REQUIREMENTS

Narrative on Lighting System and Controls

On drawings where light fixture layout plans and schedules are documented, a narrative must be provided to describe the function and operation of mandatory lighting and power controls.

1 RCNY §5000-01 (g)(3)

Lighting System Functional Testing

Drawings must specify the requirements that:

- The approved agency must certify that the installed lighting control systems including occupant sensor controls, time-switch controls, and daylight-responsive controls have been tested and perform as intended.
- Documents certifying the installed lighting controls meet documented performance criteria of Section C405 must be provided to the building owner within 90 days of the receipt of the certificate of occupancy.

C408.3
9.7.3.1

Hotel Guestrooms

For hotel and motel guestrooms (sleeping units or guest suites), drawings must specify a master control device that is capable of automatically switching off all installed luminaires and switched receptacles *within 20 minutes* of all occupants leaving the guestroom.

C405.2.4
9.4.1.3

Display and Accent Lighting

Display lights, accent lights, and lighting in display cases must be controlled by a dedicated control that is independent of the controls for other lighting within the room or space. Controls' locations must be clearly noted on the light fixture layout plans.

C405.2.4
9.4.1.3

Parking Garage

Parking garage lighting must be designed so that:

1) Lighting is automatically shut off during periods when the space is scheduled to be unoccupied.
2) Luminaire lighting power is automatically reduced by minimum 30% within 15 minutes of no activity detected in each lighting zone of maximum 3,600 sf.
3) Luminaires for covered garage entrances and exits are separately controlled so the lighting power is automatically reduced by minimum 50% from sunset to sunrise.
4) The power to luminaires within 20 ft of perimeter walls with opening-to-wall ratio ≥ 40% and no exterior obstructions within 20 ft is reduced in responsive to daylight by minimum 50%.

9.4.1.2

Exit Signs

Light fixture schedules must indicate that the wattage of exit signs (internally illuminated type signs) is *maximum 5 watts per side*.

C405.1.1
9.4.5

ELECTRICAL POWER REQUIREMENTS

Voltage Drop

The total voltage drop across the feeder conductors and branch circuits combined must not exceed 5%, unless the feeder conductors and branch circuits are dedicated to emergency services.

C405.9
8.4.1

Automatic Receptacle Control

Drawings must specify that:

- Minimum 50% of receptacles in spaces including private offices, conference rooms, and classrooms, etc., *and*
- Minimum 25% of branch circuit feeders in modular furniture are automatically controlled:
  a) On a scheduled basis, *or*
  b) By occupant sensors, *or*
  c) By an automated signal from another control or alarm system.

8.4.2

Separate Metering for Dwelling Units and Large Tenant Spaces

Drawings must indicate that:

- *Each dwelling unit* in a Group *R-2* building must be provided with *a separate electrical meter*.
- *Each covered tenant space* in a new building must be provided with *a separate meter or sub-meter* to measure the electrical consumption of each space. Refer to Section 28-311.2 of the Administrative Code of the City of New York for definitions.
- Locations of electrical meters must be shown on plan drawings.

R404.2
C405.5
8.4.5
8.4.6

Electrical Energy Monitoring for Whole Building

(1) New buildings ≥ 25,000 sf, or new Group R buildings with common area ≥ 10,000 sf, must have measurement devices capable of recording electrical energy use every 60 minutes (every 15 minutes for ASHRAE) and the capability to report that use on an hourly, daily, monthly and annual basis.

(2) New buildings and tenants of new buildings must have measurement devices capable of monitoring electrical energy use separately for:
a) Total electrical energy,
b) HVAC systems,
c) Interior lighting, d) Exterior lighting, and e) Receptacle circuits. [Note (2) is for ASHRAE only.]

C405.12
8.4.3

Supplied Energy Monitoring for Whole Building

- For new buildings ≥ 25,000 sf, or new Group R buildings with common area ≥ 10,000 sf, measurement devices must be installed to individually monitor energy use of the following types of energy supplied by provider/plant outside the building:
  a) Natural gas
  b) Fuel oil
  c) Propane
  d) Steam
  e) Chiller water
  f) Hot water

C405.11
10.4.5.1

ELECTRICAL POWER REQUIREMENTS

Elevator Cabs

C405.8.1
10.4.3

Drawings must specify that:

- **Lighting efficacy:** For each elevator cab's interior lighting, total lumens divided by total watts must be ≥ 35 lumens/watt.
- **Ventilation fan power:** Ventilation fans in elevator cabs without their own air-conditioning system must not consume power > 0.33 watts/cfm.
- **Controls to de-energize:** When stopped and unoccupied with doors closed for over 15 minutes, cab interior lighting and ventilation systems must be automatically controlled to be de-energized.

Traction Elevator Power Conversion System

C405.8.1.1
10.4.3.5

New traction elevators with a rise ≥ 75' in new buildings must have a power conversion system with the following:

- **Induction Motors** with a Class IE2 efficiency rating, or approved alternative technologies
- **Transmissions** not reducing the efficiency of the combined motor/transmission below that shown for the Class IE2 motor for elevators with capacities below 4,000 lbs.
- **Regenerative Drive** recovering potential energy released during motion and supplying it to the building electrical system

Escalators and Moving Walks

C405.8.2
10.4.4

- **Automatic speed reduction:** Drawings must specify that *escalators and moving walks* have controls to *automatically reduce speed* when not conveying passengers.
- **Regenerative Drive:** An *escalator* designed either for *one-way down operation only* or for *reversible operation* must have a *variable frequency regenerative drive* that supplies electrical energy to the building electrical system when the escalator is loaded with passengers whose combined weight > 750 lbs. See Figure below.

Commercial Kitchen

C405.10
10.4.6

Commercial kitchen equipment must comply with the minimum efficiency requirements of the Tables listed in the section (at right).

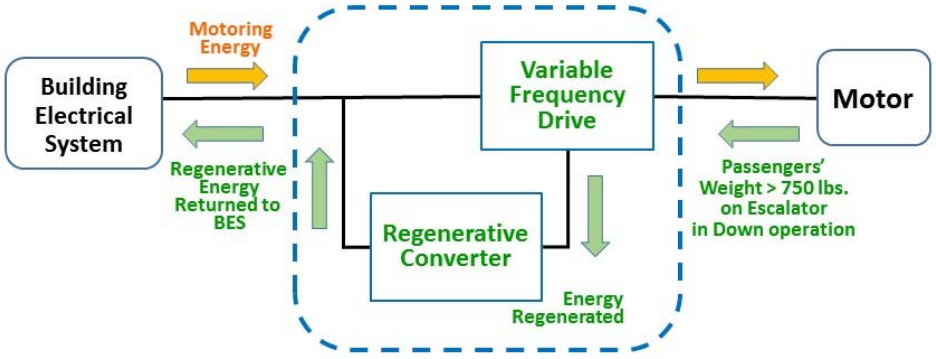


Figure LE-11.
Escalator Variable Frequency Regenerative Drive

How-to Guide:
Supporting Documentation

In Compliance with

2020 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 2020 NYCECC; 2) Not to replace or represent the entire 2020 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 2020 NYCECC and related regulations of the City of New York and the Department of Buildings.

MANDATORY ADDITIONAL EFFICIENCY PACKAGE

[NOTE] In the 2020 NYCECC, this Additional Energy Efficiency requirement is mandatory provision for all new Commercial buildings regardless of the chosen Code Compliance Path (either ECC-following, or ASHRAE-following job application).

- ## Seven (7) Options for New Commercial Buildings

  New Commercial buildings must demonstrate compliance with **at least one of the seven options below** as an additionally required energy efficiency system. The chosen efficiency system must be clearly indicated through Energy analysis and/or EN- labeled drawings, and the construction drawings must provide detailed data to ensure implementation of the chosen system.

  C406
  Appendix I

  Option 1. More Efficient HVAC Performance — *C406.2* *Appendix I I2*

  Option 2. Reduced Lighting Power Density — *C406.3* *Appendix I I3*

  Option 3. Enhanced Digital Lighting Controls — *C406.4* *Appendix I I4*

  Option 4. Dedicated Outdoor Air System (DOAS) — *C406.5* *Appendix I I5*

  Option 5. Reduced Energy Use in Service Water Heating — *C406.6* *Appendix I I6*

  Option 6. Enhanced Envelope Performance — *C406.7* *Appendix I I7*

  Option 7. Reduced Air Infiltration — *C406.8* *Appendix I I8*

- ## Five (5) Options for New Tenant Spaces

  New tenant space must demonstrate compliance with **at least** one of the five options above – Option 1 through Option 5 -- as an additionally required energy efficiency system. The chosen efficiency system must be clearly indicated through Energy analysis and/or EN- labeled drawings, and the construction drawings must provide detailed data to ensure implementation of the chosen system.

  C406.1.1
  Appendix I I1.2

MANDATORY ADDITIONAL EFFICIENCY PACKAGE

Option 1.

More Efficient HVAC Performance

C406.2
Appendix I I2

– Exceed the Minimum by 10%

- HVAC equipment exceed the minimum efficiency requirements of C403.3.2 [ECC] or 6.8.1 [ASHRAE] by 10%
- Equipment types that are not subject to the minimum 10% efficiency improvement are less than 10% of the total building system capacity.

To demonstrate compliance with this option:

- Provide HVAC equipment schedules specified with improved efficiency.
- Provide Energy analysis to compare proposed efficiencies against the minimum, 10%-improved efficiencies.
  - Note that the COMcheck software has capacity to auto-calculate the minimum, 10%-improved efficiency values.

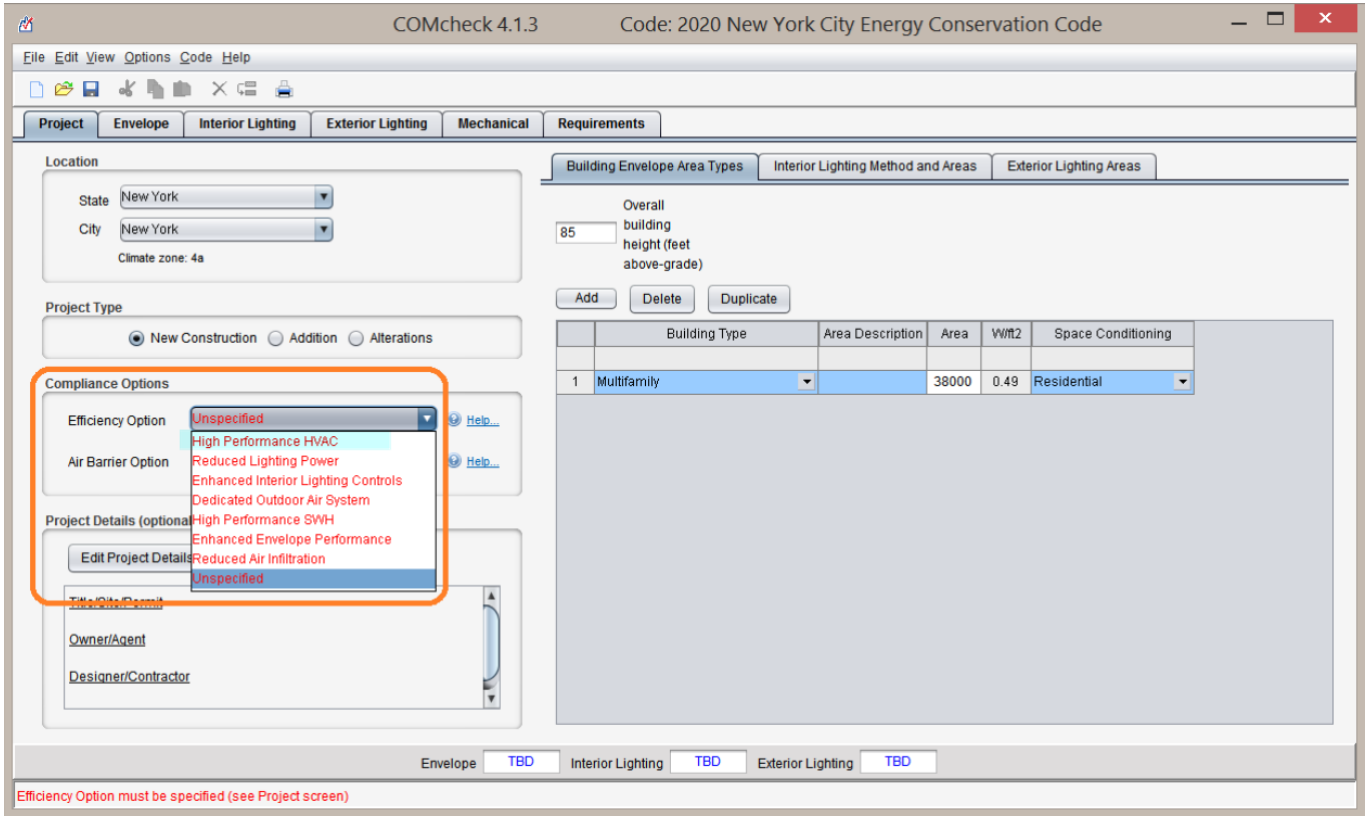


Figure OR-2.
COMcheck Program Screenshot
- Project tab showing Additional Efficiency Options

MANDATORY ADDITIONAL EFFICIENCY PACKAGE

Option 2.

Reduced Lighting Power Density (LPD)

C406.3
Appendix I I3

– Total LPD < 90% of the Allowed Maximum

- Total interior lighting power < 90% the total allowed by the Building Area Method in C405.3.2.1[ECC] or 9.5.1 [ASHRAE]
- Total interior lighting power < 90% the total allowed by the Space-by-Space Method in C405.3.2.2[ECC] or 9.6.1 [ASHRAE]

To demonstrate compliance with this option:

- Provide lighting fixture schedules complete with fixture wattages and fixture counts.
- Provide Energy analysis to compare the calculated proposed LPD against the reduced maximum (90%) LPD.
  - Note that the COMcheck software has capacity to auto-calculate the reduced maximum LPD values.

Option 3.

Enhanced Digital Lighting Controls

C406.4
Appendix I I4

– Advanced Control Operation of Interior Lighting

- Controls including Continuous dimming of luminaires and Tighter zone controls
- Digital control systems including Reconfigurable controls and Load shedding
- Submittal of lighting controls Sequence of Operations, and thorough implementation of functional testing

To demonstrate compliance with this option:

- Provide lighting plans with individual control locations and control zone boundaries.
- Provide lighting controls narratives that specify the required controls space-by-space in detail.
- A Sequence of Operations for the digital control systems shall be submitted to the DOB upon request.

MANDATORY ADDITIONAL EFFICIENCY PACKAGE

Option 4.

Dedicated Outdoor Air System (DOAS)

C406.5
Appendix I I5

– 100% Outdoor Air Ventilation System with Energy Recovery

- Independent ventilation system is specified for each individual occupied space to provide 100% outdoor air. For the list of systems subject to this option, see C406.5 [ECC], or I5 [ASHRAE].
- The ventilation system is equipped with energy recovery system.
- The system includes controls that automatically reset the supply-air temperature in response to building loads or OA temperatures.

To demonstrate compliance with this option:

- Provide HVAC equipment schedules that specify DOAS+ERV for all applicable systems.

Option 5.

Reduced Energy Use in Service Water Heating (SWH)

C406.6
Appendix I I6

– Waste Heat Recovery, or On-site Renewable Energy Systems to Reduce SWH Energy

- Minimum **60 %** of the building's annual hot water requirements, or
- **100 %** of the building's annual hot water requirements, with Condenser heat recovery system

  are provided by

  a) Waste heat recovery from service hot water, heat-recovery chillers, building equipment, or process equipment, and/or

  b) On-site renewable energy water-heating systems
- This option is applicable to the following occupancy groups:
  - 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

To demonstrate compliance with this option:

- Provide mechanical/plumbing drawings that specify in detail Waste heat recovery system and/or On-site renewable energy water-heating systems
- Provide summary calculation of the building's annual hot water requirements, and % of hot water supplied by this option.

MANDATORY ADDITIONAL EFFICIENCY PACKAGE

Option 6.

Enhanced Envelope Performance

C406.7
Appendix I I7

– Minimum 15% Improvement

- The proposed building thermal envelope performance demonstrates a minimum 15 percent improvement compared to the code-prescriptive building envelope.

  To demonstrate compliance with this option:

  - Provide drawings that document entire building envelope assemblies and their thermal values – e.g. Opaque assemblies schedule and details (roof, walls, floors, etc.), Fenestration schedules (windows and doors)
  - Provide Energy analysis to compare the proposed building envelope thermal values against the 15 %-improved envelope values.
    - Note that the COMcheck software has capacity to auto-calculate the 15 %-improved envelope thermal values.

Option 7.

Reduced Air Infiltration

C406.8
Appendix I I8

– Maximum 0.25 cfm/sf Air Leakage @ 75 Pascals

- Air Leakage Testing conducted in accordance with ASTM E779 or ASTM E1827 shall verify that the air leakage rate of the whole building does not exceed 0.25 cfm/sf at a pressure differential of 75 Pascals.

- The testing report including the building data (e.g., envelope surface area, floor area, etc.) and the test results shall be submitted to the building owner.

  To demonstrate compliance with this option:

  - Provide on drawings statement to direct air leakage testing, and specify detailed requirements
  - The testing report shall be submitted to the DOB upon request.

PERMANENT CERTIFICATE

1 RCNY §5000-01(g)(4)
R401.3
C401.2.1

- Residential Buildings and Group R-3 Commercial Buildings are required to have the Permanent Energy Efficiency Certificate posted inside the building.
- The Builder or Other Approved Party must complete and post the Certificate.

Required Data Contents in the Certificate

- **R-values in Opaque assemblies** and other components – insulation in ceiling/roofs, walls, floor/foundation components, and ducts outside the conditioned spaces
- **U-factors and SHGC values of Fenestration** – windows and doors
- **Air Leakage Testing results**
- **Mechanical equipment Types and Efficiencies** - HVAC and Service water heating equipment

Location of the Permanent Certificate

- Drawings must specify that the Certificate shall 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 must specify that the existing Certificate shall be updated and re-installed.

Permanent Energy Efficiency Certificate

Insulation Rating					
Ceiling/Roof	Attic	R-50 cavity			
	Vaulted	R-50 cavity			
Walls	Framed wall (wood frame)	R-6 continuous	+ R-21 cavity		
	Mass wall	n/a			
	Basement	R-15 continuous			
	Crawl Space	n/a			
Floors	Over unconditioned space	R-30 cavity			
	Slab Edge	R-12 continuous	4 ft deep		
Ducts outside Conditioned space	Attic	R-10			
	Other	R-8			
Fenestration Rating					
Window	U-Factor (NFRC)	U-0.25		SHGC (NFRC)	0.36

Figure OR-6.a. ***Sample Permanent Energy Efficiency Certificate (partial view)***
[Click here for the full view of a Sample certificate and a Sample suggested form]

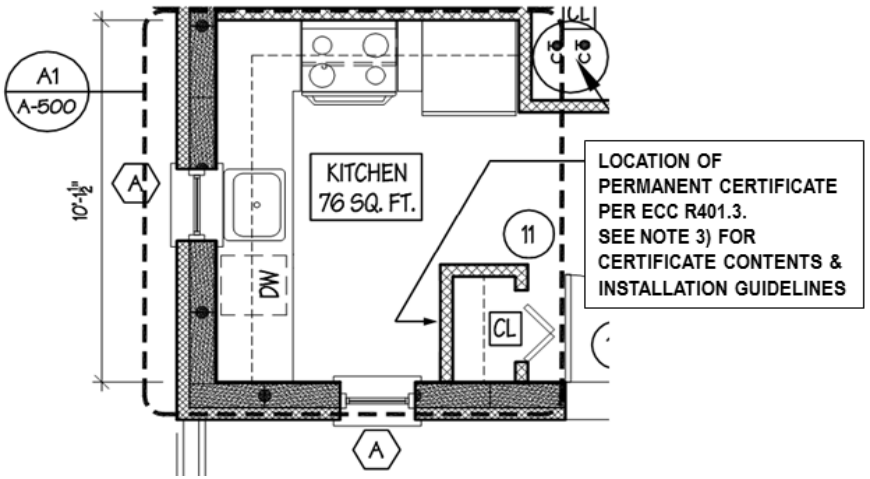


Figure OR-6.b. ***Sample Plan Drawing indicating Certificate Requirement***

ELECTRICAL VEHICLE SERVICE READY

R404.3

- **This Requirement Applies to**
  - One or Two-family dwellings with Parking area
  - Low-rise Multi-family buildings with Parking area
  - Townhouses with Parking area

- **For Each Dwelling Unit, provide:**
  - 208/240V 40-amp outlet, or
  - Panel capacity and conduit for the future installation of such an outlet adjacent to the parking area.

- **For Residential occupancies with Common Parking Area, provide:**
  - Panel capacity and conduit for the future installation of 208/240V 40-amp outlets for 5 percent of the total parking spaces, but not less than one outlet, or
  - 208/240V 40-amp outlets for 5 percent of the total parking spaces, but not less than one outlet.

Figure OR-7.
Electrical Outlet Ready for Electrical Vehicle Service
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 the *Rated Design* of a newly proposed residential building to demonstrate compliance with the 2020 NYCECC, the ERI analysis on the building must result in the ***ERI score of 50 or less*** (for Climate Zone 4). A residential building that achieves the rated ERI score of 50 is 50% more energy efficient than the *Reference Design* building, which meets the 2006 IECC (ERI score of 100).

R406.3
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 of the 2011 NYCECC). However, if on-site renewable energy is included in the calculation of the ERI score, the building thermal envelope is to meet the 2016 NYCECC prescriptive requirements (Table R402.1.2 or Table R402.1.4)
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
R406.4
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 chosen Energy Analysis method.*

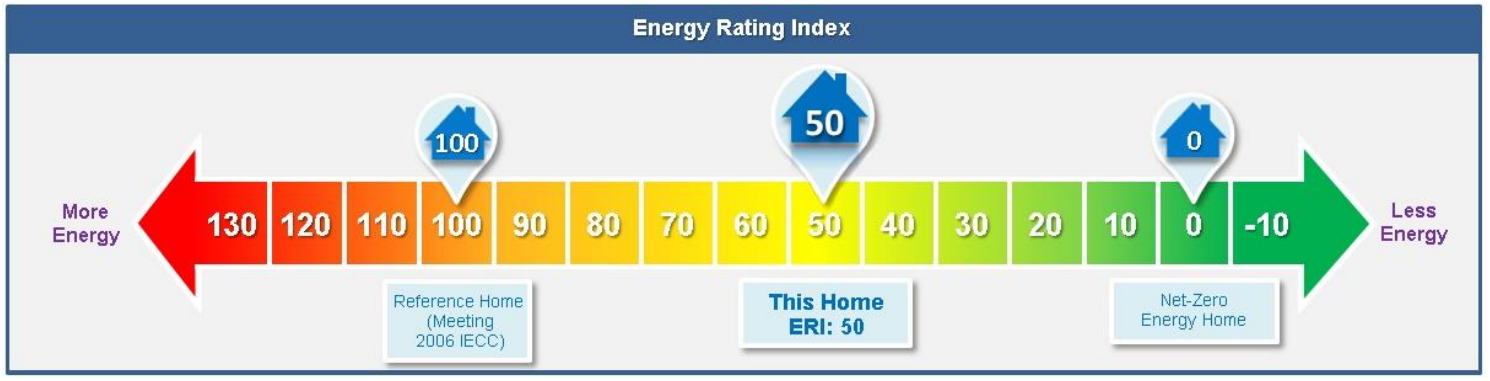


Figure OR-8. ***Sample Energy Rating Index Label***

SYSTEM COMMISSIONING

Specify Total Proposed Heating and Cooling Capacity

- For ALL Commercial building job applications including New buildings, Additions, and Alterations

  1 RCNY §5000-01(g)(5)(iii)

  Total Heating Equipment Capacity (in Btu/h) being Installed, or
  Total Heating Equipment Capacity (in Btu/h) Serving the Alteration space
  and
  Total Cooling Equipment Capacity (in Btu/h) being Installed, or
  Total Cooling Equipment Capacity (in Btu/h) Serving the Alteration space

  Must be clearly calculated and documented *on an EN- labeled sheet*.

- *Total Heating Equipment Capacity' calculations must include the 'Service Water Heating' equipment capacity.*

Specify Whether System Commissioning is Required

- Drawings must clearly state *whether or not* System Commissioning is required.

  1 RCNY §5000-01(g)(5)(iii)
  C408.2
  6.7.2.3

- System Commissioning is *not required* for:
  - Mechanical systems of **Total Heating** capacity Installed, or Serving the Alteration Space **< 600 k Btu/h**
  - Mechanical systems of **Total Cooling** capacity Installed, or Serving the Alteration Space **< 480 kBtu/h**
  - **Renewable Energy** systems of Total generating capacity **< 25 kW**

Areas Where Commissioning is Required

- For 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.

  C408.2
  C408.3
  6.7.2.3
  9.7.3

- Commissioning-required systems, at a minimum, include the following:

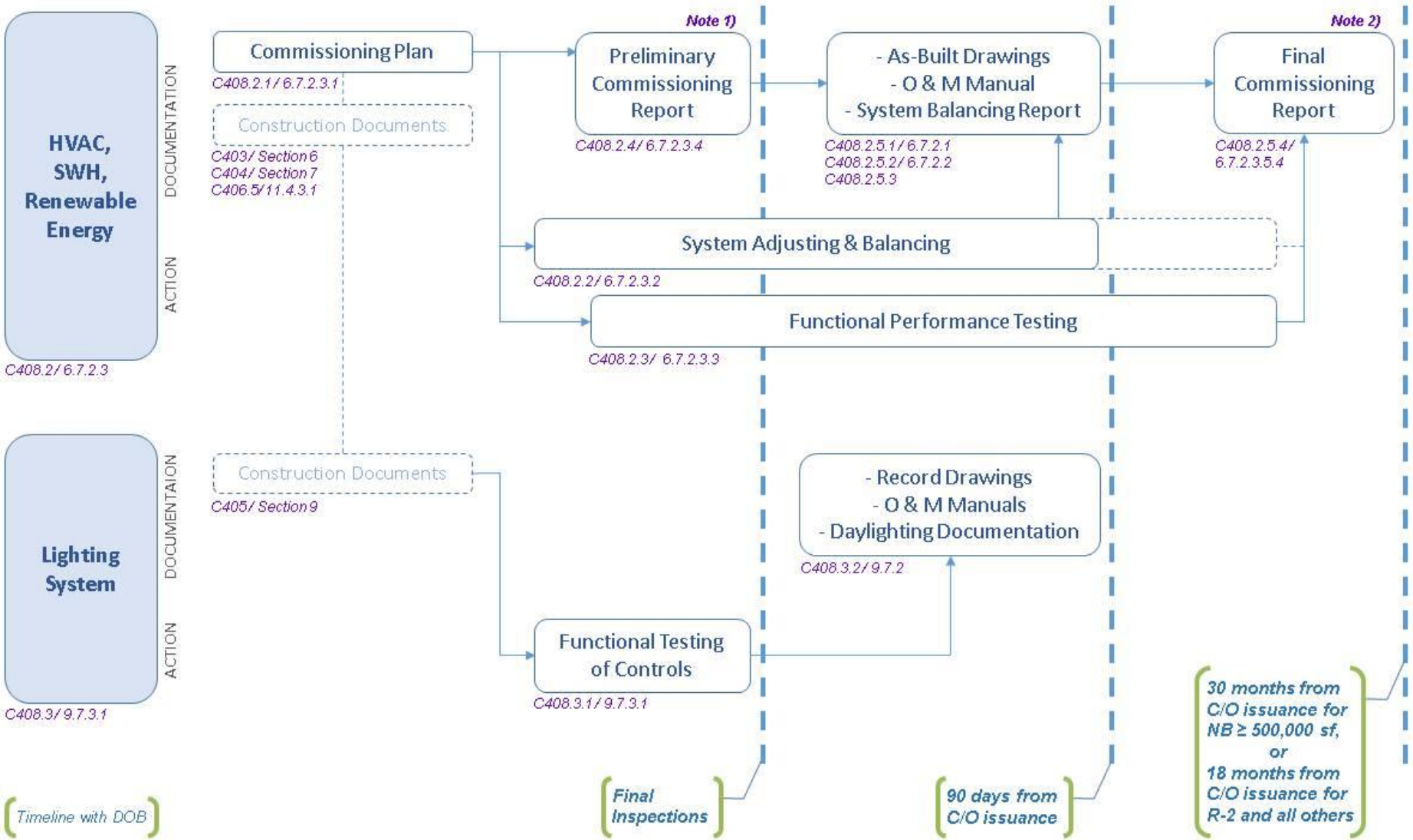
  Mechanical Systems

  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.

  Lighting Control Systems

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

SYSTEM COMMISSIONING



Note 1) Upon the owner's receipt of the Preliminary Commissioning Report, the owner (owner's authorized agent) shall send a letter acknowledging the receipt to DOB at cx@buildings.nyc.gov.

Note 2) Upon completion of the final commissioning procedures, the owner (owner's authorized agent) shall send the Final Commissioning Report to DOB at cx@buildings.nyc.gov. Click **here** for more information in the FAQ under DOB Energy Code website.

Figure OR-10. ***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 <u>following *ECC*</u> must comply with: *R501.4 C501.4*
  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 <u>following *ASHRAE*</u> must comply with: *4.2.1.2 4.2.1.3*
  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**

Clear Scope of Work

- Construction drawings must clearly define the proposed scope of work in the existing buildings by: *1 RCNY §5000-01(g)*
  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.'

Alterations vs. Additions on 'Historic Building'

- Repair, restoration, and <u>**Alteration work of**</u>, and change of occupancy to <u>**'Historic Building' are exempt**</u> from the ECC compliance requirements. *R501.6 C501.6*
  1) The ECC exemption for 'Historic Building' is <u>limited to the National or New York State historic building</u> and does *not* apply to New York City-designated historic building. For the complete definition of 'Historic Building,' refer to Section R202 or C202.
  2) Job applications declaring exemptions of ECC compliance for the reason of 'Historic Building' must provide on an EN- labeled drawing:
     - Professional Statement declaring exemption and the basis for exemption
     - Documentation obtained from the New York State Historic Preservation Office's online tool called the New York State Cultural Resource Information System (CRIS*) clearly indicating that the subject building is listed as, or is eligible for listing as a historic building, or a contributing building to a historic district in the NY State or National Register of Historic Places

       * If CRIS data for a specific building within the National Register of Historic Places is inconclusive, more information may be found by contacting the National Park Service National Register Database.
- <u>**Additions to 'Historic Building' are *not* exempt**</u>, and thus the 'Added' portion to the Historic Building must demonstrate compliance with the ECC according to provisions under Section R502 or Section C502.

CHANGES TO EXISTING BUILDINGS

A. Additions

R502
C502

- 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.'

B. Alterations

R503
C503

- 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 10 % 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

CHANGES TO EXISTING BUILDINGS

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

R503
C503

- 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.

C. Repairs

R504
C504

- 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.

D. Change of Occupancy or Use

R505
C505

- 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.