



How-to Guide: *Supporting Documentation*

In Compliance with 2016 New York City Energy Conservation Code

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

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

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. C405.4
9.2.2.3
- Light fixture schedules must be complete with fixture identification keys, fixture/lamp type, number of lamps per fixture, fixture wattages and quantities that match the light fixture layout plans. 1 RCNY §5000-01(g)(2)
- 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]. R404.1
C405.1
9.1.1
- 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.

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. C405.4.2
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 C405.4.2(1), or Table 9.5.1 C405.4.2.1
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 C405.4.2(1).

LIGHTING FIXTURE SCHEDULE									
Fixture ID	SPACE Types	MANUFACTURER, MODEL	LAMP TYPE	NUMBER OF LAMPS/FIXTURE	BALLAST TYPE	TOTAL NUMBER OF FIXTURES	FIXTURE WATTAGE (W)	TOTAL WATTAGE	COMMENTS
L1	Sales Area	000000 LIGHTING SYSTEMS - ECS-LPW-4-WN-232-UNV-12H-RST	TRACK LIGHT	N/A	ELECTRONIC	10 Linear Feet	N/A	300	30W/LF X 10 LF = 300W (per ASHRAE 9.1.4 -c.1)
L2	Sales Area	0000 LIGHTING - LED DOWNLIGHT - #2221W-B1-F-10-LRTD3	LED	1	ELECTRONIC	32	14	448	See Narratives below for lighting controls.
L3	Dressing/Fitting Rooms	00 LIGHTING - M40-2-3-OCT-ELD-UN W. INTEGRAL OCCUP. SENSOR	FLUORE -SCENT	2	ELECTRONIC	4	64	256	See Narratives below for lighting controls.
L4	Storage	000 LIGHTING - LED DOWNLIGHT - #LRTA3-8414-M4-30KS	LED	1	ELECTRONIC	58	14	812	See Narratives below for lighting controls.
L5	Restrooms	0000 LIGHTING - LED DOWNLIGHT - #999W-D1-A-10-EEE3	LED	1	ELECTRONIC	18	14	252	See Narratives below for lighting controls.

Figure LE-1. Sample Lighting Fixture Schedule for Retail Space Fit-Out

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 C405.4.2(2), or Table 9.6.1)

C405.4.2.2
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

- For Residential buildings, also for Dwelling units within Commercial buildings, a minimum of 75% of the lamps in newly installed permanent lighting fixtures must be high-efficacy lamps.
- Light fixture schedules must clearly identify the lamp type (e.g., CFL, T-8, T-5, etc.), efficacy information (in lumens/watt) of all high-efficacy lamps, and the percentage of the high-efficacy lamps.

R404.1
C405.1
9.1.1

- For the definition of “High-Efficacy Lamps,” refer to R202 and C202, or Section 3 of ASHRAE.



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

OCCUPANT SENSOR CONTROLS*

■ Where Required

- Occupant sensor controls are required in spaces including: classrooms, conference rooms, copy rooms, lounges, employee break rooms, private offices, restrooms, storage rooms, janitor closets, locker rooms, warehouses, open plan offices, 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.

C405.2.1
Table 9.6.1

■ Occupant Sensor Control Function

- **Automatic-Off:** Drawings must specify that occupant sensor controlled luminaires are *automatically turned off within 20 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.

C405.2.1.1
9.4.1.1.b
9.4.1.1.c

■ Controls in Open Plan Offices

- Lighting in Open Plan offices must be specified to be controlled by occupant sensors.
- The maximum area in the Open Plan offices controlled by one (1) occupant sensing device is 2,500 sf (as compared to the maximum area of 5,000 sf per device for other occupant-sensor-required areas).
- Full automatic-on controls are allowed in Open Plan offices.

C405.2.1.1
9.4.1.1.h

*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

In spaces where occupant sensor controls (previous page) are not provided, both time-switch controls and light-reduction controls must be provided. The controls' function and locations must be clearly specified on drawings. C405.2.2

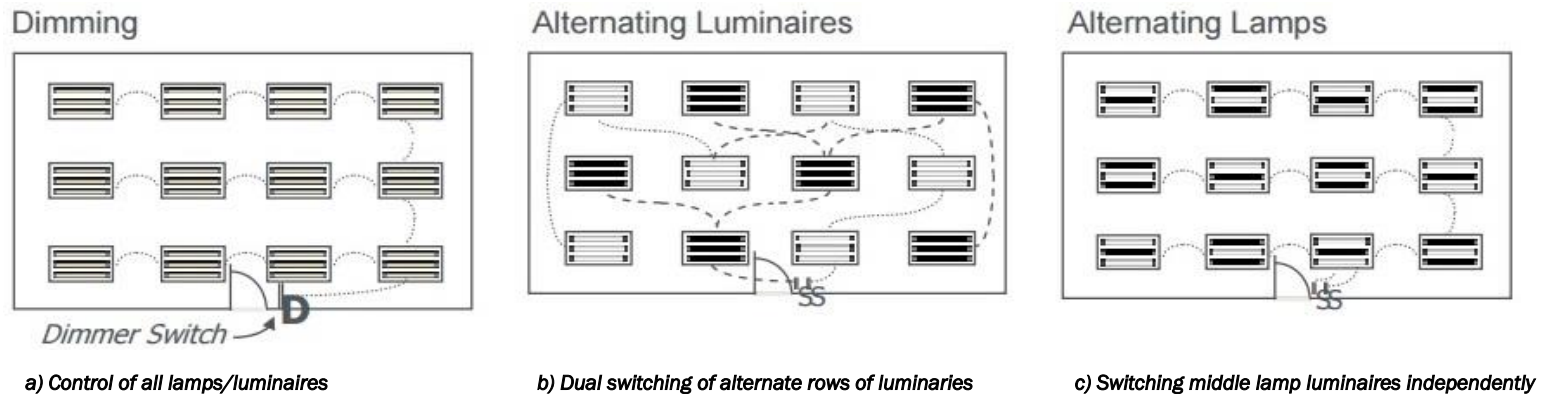
Time-Switch Controls (Programmed)

Time-switch controls must be designed to: C405.2.2.1

- 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)

- 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%. C405.2.2.2
- 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 luminaires
 - 3) Switching middle lamp luminaires independently
 - 4) Switching each lamp/luminaire



*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

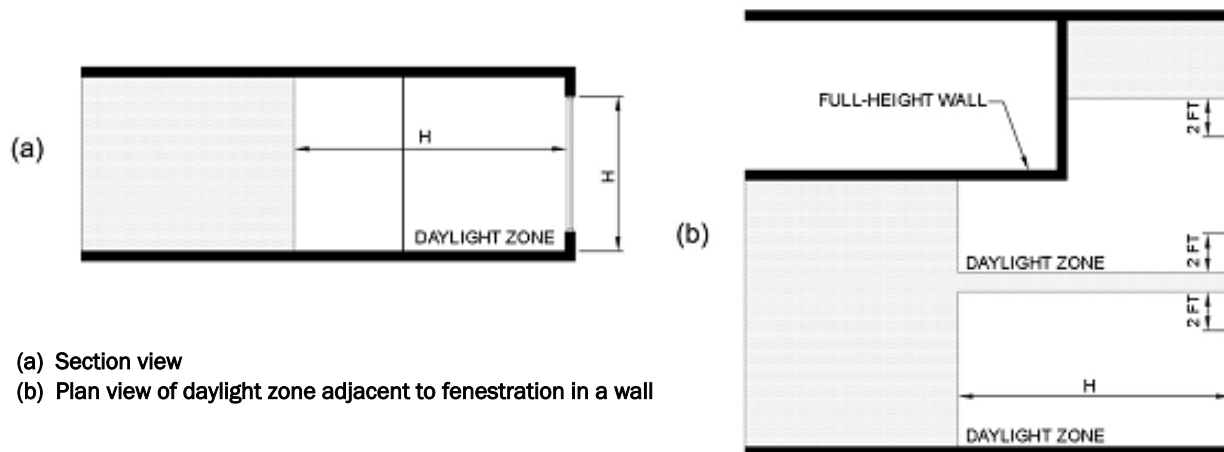
- For spaces having electric lights > 150 watts within daylight zones, independent controls for the lights within daylight zones must be specified.
- For this purpose, light fixture layout plans must clearly *delineate the boundary of each daylight zone*, and indicate separate circuiting and switch control 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.

C405.2.3
9.4.1.1.e & f
9.7.2.3

Sidelight Daylight Zone

- The *sidelight* daylight zone must be identified on drawings in the floor area *adjacent to vertical fenestration*.
- When the fenestration is located in a wall, the daylight 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 daylight zone following ASHRAE, refer to the definition of 'daylight area' in ASHRAE Section 3.2.

C405.2.3.2
3.2



- For Daylight Zone under Fenestration located in a Rooftop Monitor following ECC, refer to Figure C405.2.3.2(2) and C405.2.3.2(3).
- For Daylight Zone computations following ASHRAE, refer to Figure 3.2-1 through Figure 3.2-4.

Figure LE-6.
Daylight Zone Adjacent to Fenestration in a Wall

*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*

■ Toplight Daylight Zone

- The *toplight* daylight zone must be identified on drawings in the floor area *underneath a roof fenestration assembly*.
- The daylight zone under a roof skylight extends laterally and longitudinally beyond the edge of the roof skylight:
 - (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 daylight zone following ASHRAE, refer to the definition of 'daylight area' in ASHRAE Section 3.2.

C405.2.3.3
3.2

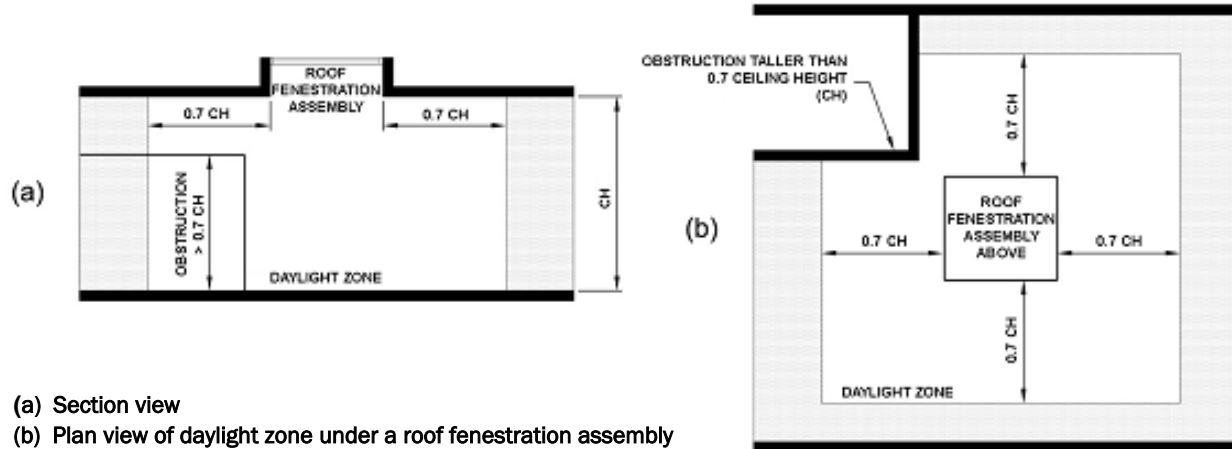


Figure LE-7.
Daylight Zone Under a Roof Fenestration Assembly

• For Daylight Zone computations following ASHRAE, refer to Figure 3.2-1 through Figure 3.2-4.

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

EXTERIOR LIGHTING POWER

■ Maximum Allowed Exterior Lighting Power

- 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, fixture wattages and quantities that match the light fixture layout plans.

C405.5.1
9.4.2

■ Calculation of Maximum Allowance

- The maximum allowed building exterior lighting power must be computed based on Table C405.5.2(2) for the applicable Exterior Lighting Zone per 1 RCNY §5000-01(g)(3)(ii).

$$\begin{array}{l} \text{Maximum Allowed Exterior} \\ \text{Lighting Power} \end{array} = \begin{array}{l} \text{Base Site Allowance} \\ \text{(per Lighting Zone)} \end{array} + \begin{array}{l} \text{Individual Allowance per Area Type} \\ \text{(Tradable/Non-Tradable Surfaces)} \end{array}$$

C405.5.1
1 RCNY §5000-01
(g)(3)(ii)
9.4.2

- Trade-offs are allowed only among exterior lighting applications in the Tradable Surfaces of Table C405.5.2(2).

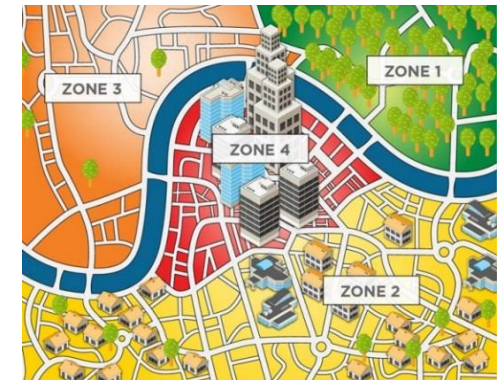
Lighting Zone 1: Park land.

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



Source: energycodes.gov

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

■ Exterior Lighting Controls

- Drawings must specify that the building exterior lighting systems are provided with controls that automatically turn off the lighting as a function of available daylight.
- For systems illuminating the *building façade or landscape*, the lighting must have controls that automatically shut off the lighting as a function of dawn/dusk and a set opening and closing time.
- For *all other* building exterior lighting, the lighting must have controls that automatically reduce the connected lighting power by minimum 30% during the nighttime.

C405.2.5
9.4.1.4

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
9.4.4

▪ 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) Scheduled automatic shutoff is incorporated;
- 2) Luminaire lighting power is automatically reduced by minimum 30% within 20 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; and
- 4) Luminaires within 20 ft of walls with window openings have a daylight-responsive control.

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*.

C405.3
9.4.3

ELECTRICAL POWER REQUIREMENTS

▪ Voltage Drop

The conductors for feeders and branch circuits combined must be sized for a maximum of 5% voltage drop total, unless the feeder conductors and branch circuits are dedicated to emergency services.

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:
 - 1) On a scheduled basis, or
 - 2) By occupant sensors, or
 - 3) 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.
- Locations of electrical meters must be shown on plan drawings.

R404.2
C405.6.1
8.4.5

▪ Electrical Energy Monitoring for Whole Building and Large Tenant Spaces

- For new buildings $\geq 25,000$ sf,
- For large tenant spaces $\geq 10,000$ sf within new buildings, and
- For new residential building common areas $\geq 10,000$ sf measurement devices must be installed to monitor the electrical energy use for each of the following separately:
 - 1) Total electrical energy
 - 2) HVAC systems
 - 3) Interior lighting
 - 4) Exterior lighting
 - 5) Receptacle circuits.

8.4.3

- *Definition of "Covered Tenant Space":*
 - (a) A tenant space $> 5,000$ GSF on one or more floors of a covered building let or sublet to the same person, or
 - (b) A floor $> 5,000$ GSF of a covered building consisting of tenant spaces let or sublet to two or more different persons.

For the definition of Covered Building, refer to Section 28-311.2 of [the Administrative Code of the City of New York](#).

ELECTRICAL POWER REQUIREMENTS

■ Elevator Cabs

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.

C405.9.1
10.4.3

■ Escalators and Moving Walks

- **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 pounds.

C405.9.2
10.4.4

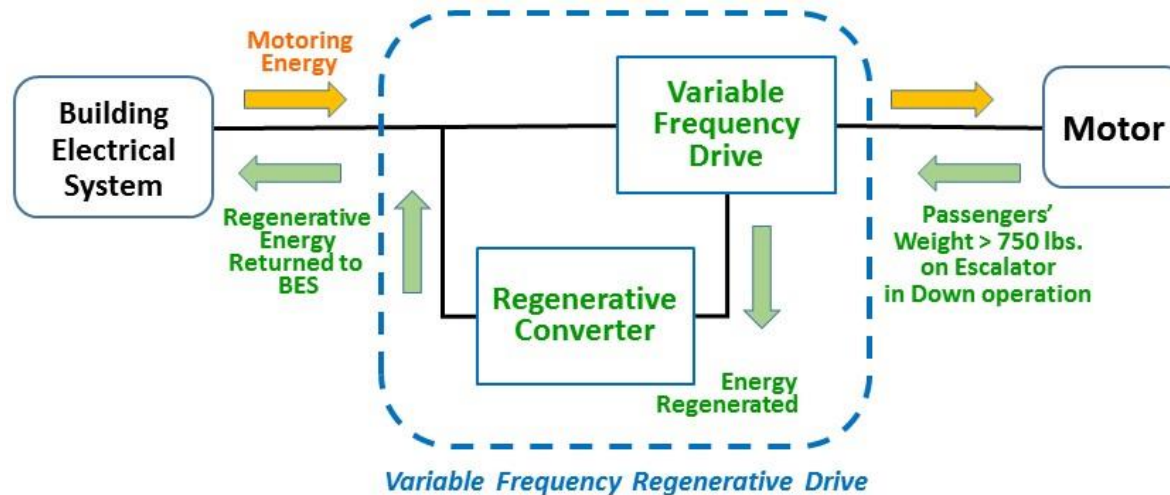


Figure LE-11. Escalator Variable Frequency Regenerative Drive