



2017 District of Columbia
Commercial Energy Conservation
Code

Commercial Energy Training

DCMR 12I Amends ASHRAE Standard 90.1 2013

Heavily amended by the District

- Alternative Compliance Paths
- Building Envelope
- Mechanical Systems and Service Water Heating
- Electrical Power and Lighting
- Other Equipment – Key Updates
- Construction – Key Updates
- Renewable Energy Systems – Key Updates
- Net-Zero Energy Compliance Paths



Commercial Buildings

Alternative compliance paths for commercial buildings

- Appendix Z
- ILFI's Living Building Challenge (with Energy Petal) or Zero Energy Certification
- PHIUS certification plus on-site solar to offset building load
- PHI certification plus on-site solar to offset building load
- LEED certification plus LEED Zero Carbon or Zero Energy certification

Building Envelope

(DCMR 12I Section 5)

INTENT: SET MINIMUM LEVELS OF THERMAL PERFORMANCE FOR ALL COMPONENTS OF THE BUILDING ENVELOPE TO REDUCE HEAT GAINS AND LOSSES ACROSS ALL CLIMATE ZONES.

Building Envelope

Key Requirements from 90.1 plus DC Amendments for:

- Insulation and Fenestration
- Roof Solar Reflectance
- Air Leakage

Building Envelope - Key Updates

Applicable new or modified definitions (DCMR 12I Section 3)

- *Daylight area* is altered to provide a single *side lighted area* definition (removing secondary side lighted area)
- Defines *thermal barrier* as the boundary between conditioned and unconditioned space which does not contain thermal bridges.
- Defines *thermal bridge* as the part of a building's conditioned envelope which spans between the conditioned and unconditioned space, has an R-value of 1.5 per inch or less, and is not otherwise insulated along the one-dimensional conductive heat transfer pathway of less than R-3/inch for 1 inch. For the purposes of this definition, fenestration is not counted as a thermal bridge.

Building Envelope - Key Updates

Envelope Alterations (5.1.3)

- Insulation must be brought up to code when roof membrane is replaced
- Only roof recovering is exempt from insulation requirements <defined term>
- Windows must be brought up to code when replaced

Building Envelope - Key Updates

Account for Thermal Bridging (5.4.1.1)

- Required for components that reduce overall U-value of assembly
- Three allowable methods for determining area-weighted U-value
 1. "Specification Approach" references predetermined coefficients based on thermal bridge for project complying with the R-value requirements
 2. "Simplified Approach" applies a default thermal bridge value for meeting U-value requirements
 3. "Detailed Approach" references predetermined coefficients based on thermal bridge for project complying with the U-value requirements

Building Envelope - Key Updates

Fenestration and Doors (5.4.3.2)

- Metal coiling doors in semi-heated spaces no longer exempted from air leakage requirements
- Air leakage for fenestration and doors shall be determined in accordance with AAMA/WDMA/CSA 101/IS2/A440, NFRC 400 or ASTM E283 as specified in this section.
- Metal coiling doors are related to subsections:
 1. 1.3 cfm/sq. ft. for non-swinging doors intended for vehicular access
 2. 0.4 cfm/sq. ft. for other non-swinging opaque, glazed, and upward acting doors
 3. 0.2 cfm/sq. ft. for all other products

Building Envelope - Key Updates

Vestibules required in more buildings (5.4.3.4)

- Buildings less than 1,000 SF are no longer exempted
- Vestibule exceptions are limited to:
 1. Revolving doors (NOTE: this applies to the revolving door only, related ADA swinging doors must have a vestibule)
 2. Doors not intended to be used as a building entrance
 3. Doors opening directly from a dwelling unit
 4. Doors that open directly from a space that is less than 3,000 sq. ft.
 5. Semi-heated spaces
 6. Enclosed elevator lobbies for building entrances directly from parking garage

Building Envelope - Key Updates

New renewable-ready requirements (5.4.4)

- Design must show allocated space and pathways for future installation of on-site renewable energy systems
- Infrastructure to support an on-site renewable energy system that covers no less than 25% of horizontal projection of the gross roof area
- Also see DCMR 12I Section 13 for renewable energy requirements.

Building Envelope - Key Updates

Opaque assembly summary (Table 5.5)

Element	ASHRAE 90.1-2010	2017 DC Energy Code
Attic Roof	R-38	R-54
Above Deck Roof	R-25 CI	R-33 CI
Wood Framed Floor	R-30	R-33
Wood Framed Wall	R-13	R-15 + R-4.1 CI
Steel Framed Wall	R-13 + R-7.5 CI	R-15 + R-8 CI

Building Envelope - Key Updates

Fenestration summary (Table 5.5)

Fenestration	
ASHRAE 90.1 - 2010	U-0.38 (fixed) and U- 0.45 (operable)
2017 DC Code	U-0.33 for nonmetal framing U-0.38 for metal framing (fixed) U-0.45 for metal framing (operable)

Building Envelope - Key Updates

Fenestration Area (5.5.4)

- Compliance demonstrated for the overall fenestration product.
- Total fenestration not greater than Table 5.5
- Total skylight area not greater than Table 5.5
- Fenestration U-factor not greater than Table 5.5

Building Envelope – Table 5.5

Table 5.5 Building Envelope Requirements for Climate Zone 4 (A,B,C)*

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value
<i>Roofs</i>						
Insulation Entirely above Deck	U-0.028	R-33 c.i.	U-0.028	R-33 c.i.	U-0.093	R-10 c.i.
Metal Building*	U-0.033	R-21 + R-12 Ls or R-28 + R-9 Ls	U-0.033	R-21 + R-12 Ls or R-28 + R-9 Ls	U-0.082	R-19
Attic and Other	U-0.0189	R-54	U-0.0189	R-54	U-0.034	R-30
<i>Walls, above Grade</i>						
Mass	U-0.094	R-11 c.i.	U-0.081	R-12.5 c.i.	U-0.580	NR
Metal Building	U-0.054	R-0 + R-17.5 c.i.	U-0.045	R-0 + R-21 c.i.	U-0.162	R-13
Steel Framed	U-0.058	R-15 + R-8 c.i.	U-0.058	R-15 + R-8 c.i.	U-0.124	R-13
Wood Framed and Other	U-0.058	R-15 + R-4.1 c.i.	U-0.058	R-15 + R-4.1 c.i.	U-0.089	R-13
<i>Wall, below Grade</i>						
Below Grade Wall	C-0.119	R-8 c.i.	C-0.092	R-11 c.i.	C-1.140	NR
<i>Floors</i>						
Mass	U-0.051	R-16 c.i.	U-0.046	R-18.4 c.i.	U-0.107	R-6.3 c.i.
Steel Joist	U-0.035	R-33	U-0.034	R-33	U-0.052	R-19
Wood Framed and Other	U-0.030	R-33	U-0.030	R-33	U-0.051	R-19
<i>Slab-on-Grade Floors</i>						
Unheated	F-0.520	R-20 for 24 in.	F-0.520	R-20 for 24 in.	F-0.730	NR
Heated	F-0.843	R-25 for 24 in.	F-0.688	R-25 for 48 in.	F-0.900	R-10 for 24 in.
<i>Opaque Doors</i>						
Swinging	U-0.45		U-0.45		U-0.700	
Nonswinging	U-0.45		U-0.45		U-1.450	

Building Envelope - Key Updates

SHGC Multipliers (Table 5.5.4.4.1)

- New table relaxes SHGC requirements based on permanent projections

TABLE 5.5.4.4.1 SHGC MULTIPLIERS FOR PERMANENT PROJECTIONS

Projection Factor	SHGC Multiplier (all Other Orientations)	SHGC Multiplier (North-Oriented)
0–0.60	1.00	1.00
>0.60–0.70	0.92	0.96
>0.70–0.80	0.84	0.94
>0.80–0.90	0.77	0.93
>0.90–1.00	0.72	0.90

Mechanical Systems (Section 6)

INTENT: PROVIDE GUIDELINES FOR EFFECTIVE ENERGY PERFORMANCE OF MECHANICAL SYSTEMS REGARDLESS OF THE TYPE USED (SIMPLE OR COMPLEX) THROUGH RIGHT SIZING AND CONTROLS.

Mechanical Systems

Key Requirements from 90.1 plus DC Amendments for:

- Calculation of heating and cooling loads
- Equipment and System Sizing
- System Controls
- Ventilation

Mechanical Systems - Key Updates

Applicable new or modified definitions (DCMR 12I Section 3)

- **Densely occupied space:** those spaces with a design occupant density greater than or equal to 25 people per 1000 ft.2 (100 m2).
- **Geothermal energy:** heat extracted from the Earth's interior and used to produce electricity or mechanical power or provide thermal energy for heating buildings or processes. *Geo-thermal energy* does not include systems such as heat pumps that use energy independent of the geothermal source to raise the temperature of the extracted heat.
- **Networked guest-room control system:** an energy management control system, accessible from the hotel/motel front desk or other central location, that is capable of identifying reserved rooms according to a timed schedule and is capable of controlling each hotel/motel guest room separately.

Mechanical Systems - Key Updates

Higher-efficiency equipment for projects following the alternate renewable approach in Section 13 (6.3.2 and 6.4.1.1.1)

- Applies to new projects, additions and alterations that are 10,000 SF or larger
- Alternate renewable approach allows for smaller on-site renewable energy systems
- Mechanical equipment must meet efficiency requirements in Normative Appendix B of ASHRAE 189.1

Mechanical Systems - Key Updates

Heat pump requirements (6.4.1.1.2)

- Heat pump required as primary heating source for spaces which are both heated and cooled using unitary systems
- Packaged systems are not allowed to include electric resistance heating unless used as back-up heat source

Mechanical Systems - Key Updates

Expanded demand control ventilation (DCV) requirements (6.4.3.8)

- Required for *densely occupied spaces* with design outdoor airflow greater than 750 cfm and with one or more of the following:
 - Air-side economizer;
 - Automatic control of dampers; or
 - With a design outdoor airflow greater than 1,000 cfm

Mechanical Systems - Key Updates

DCV design requirements (6.4.3.8.1)

- Occupancy assumptions must be shown in design documents including occupant CO2 generation assumptions
- Specific requirements for CO2 sensors
 - Spaces with a central CO2 monitoring station shall provide at least one sensor for each 10,000 ft² of floor space and shall be installed between 3 and 6 feet above the floor
 - CO2 sensor shall be accurate to 50 ppm at 1000 ppm
 - Outdoor air CO2 concentrations shall either be dynamically measured using a CO2 sensor or determined using statistical data if available

Mechanical Systems - Key Updates

Piping insulation (6.4.4.1.3)

- Applies to all branch piping and piping components
- Tables 6.8.3-1 and 6.8.3-2

Mechanical Systems - Key Updates

Broader application of economizer requirements (Table 6.5.1-1)

- Lowers cooling capacity to 33,000 Btu/h for when an economizer is required
- Previously 2013 DC ECC had two conflicting requirements:
 - Using IECC 33,000 Btu/h
 - Using 90.1 54,000 Btu/h
- Provision includes multiple exceptions for computer room applications, systems with nonparticulate air treatment, hospitals, systems with heat recovery, residential applications, systems that operate less than 20 hrs/wk, supermarkets, water cooled economizers, and VRV/VRF systems.

Mechanical Systems - Key Updates

Zone controls (6.5.2.1)

- Adds exception for commercial kitchens
- Removes exception 1, which applied to smaller systems:
 - Zones without DDC for which the volume of air that is reheated, recooled or mixed is less than the larger of the following:
 - a. 30% of the zone design peak supply rate
 - b. The outdoor airflow rate required to meet the ventilation requirements of ASHRAE 62.1 for the zone
 - c. Any higher rate that can be demonstrated, to the satisfaction of the AHJ, to reduce overall system annual energy usage
 - d. The airflow rate required to comply with applicable codes or standards such as pressure relationships or minimum air change rates

Mechanical Systems - Key Updates

Air system design and control (6.5.3)

- Specifies that hotels and motels with more than 50 guest rooms must comply with Section 6.5.12.
 - HVAC Setpoint Control
 - a. Raise (if in cooling mode) or lower (if in heating mode) set point by at least 5° F within 30 minutes of occupant leaving the room
 - b. When room is unrented or unoccupied setpoint shall automatically reset to 80°F or higher in cooling mode and to 60°F or lower in heating mode
 - Ventilation control
 - a. Exhaust fans and isolation devices shall automatically be turned off within 30 minutes of all occupants leaving guest room

Mechanical Systems - Key Updates

Lower fan power limits (Table 6.5.3.1-1)

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	Limit	Constant Volume	Variable Volume
Option 1: Fan system motor nameplate hp	Allowable nameplate motor hp	$hp \leq cfm_g \cdot 0.00099$	$hp \leq cfm_g \cdot 0.00135$
Option 2: Fan system bhp	Allowable fan system bhp	$bhp \leq cfm_g \cdot 0.00084 + A$	$bhp \leq cfm_g \cdot 0.00117 + A$

ASHRAE 90.1
- 2010

TABLE 6.5.3.1-1 Fan Power Limitation^a

	Limit	Constant Volume	Variable Volume
Option 1: Fan system motor nameplate hp	Allowable nameplate motor hp	$hp \leq cfm_g \cdot 0.0011$	$hp \leq cfm_g \cdot 0.0015$
Option 2: Fan system bhp	Allowable fan system bhp	$bhp \leq cfm_g \cdot 0.00094 + A$	$bhp \leq cfm_g \cdot 0.0013 + A$

a. where

Mechanical Systems - Key Updates

Fan efficiency (6.5.3.1.3)

- Total efficiency of the fan (at design point) shall be within 10% (lowered from 15%) points of the max total efficiency of the fan

Mechanical Systems - Key Updates

Exhaust air energy recovery (6.5.6.1)

- Energy recovery effectiveness increased to 60% (increased from 50%)

Mechanical Systems - Key Updates

Supermarket heat recovery (6.5.6.3)

- Must recover waste heat from refrigeration and or HVAC equipment
- Required for supermarket 25,000 SF or larger

Mechanical Systems - Key Updates

Kitchen exhaust systems (6.5.7.1.3 and 6.5.7.14)

- Lowers CFM threshold (from ASHRAE 90.1 2013) for exhaust flow rates for hoods (2,000) for when efficiency requirement apply
- Includes the selection of one of the following DCV requirements
 - 50% of all replacement air is transfer air that otherwise be exhausted
 - 75% of kitchen hood exhaust air is controlled by a DCV system.

Mechanical Systems - Key Updates

Automatic Demand Response (8.1.5.2)

- Controls for HVAC systems to reduce peak heating and cooling demand by 10% and logic to prevent a rebound peak (excluding hospitals, critical response facilities and Group R occupancies)
- The following building are exempt from this requirement:
 - Where the local utility provided does not include an AutoDR program
 - Where the electric demand is not greater than .75 of the standard reference design
 - Where 20% of the building's energy demand is met by on-site renewables

Service Water Heating

(Section 7)

INTENT: EMPLOY BASIC, COST-EFFECTIVE DESIGN PRACTICES TO REDUCE ENERGY USED BY MINIMIZING BOTH HEAT AND WATER LOSSES OVER THE SYSTEM.

Service Water Heating

Key Requirements from 90.1 plus DC Amendments for:

- Performance efficiency
- Temperature controls
- Heat traps
- Pipe insulation
- System controls

Service Hot Water – Key Updates

Higher-efficiency water heating equipment for projects following the alternate renewable approach in Section 13 (7.4.2)

- Applies to new projects, additions and alterations that are 10,000 SF or larger
- Alternate renewable approach allows for smaller on-site renewable energy systems
- Water heating efficiency requirements in Table 13-9 and applicable Energy Star requirements in Section 10.11.2

Service Hot Water – Key Updates

Insulation for spas and pools (7.4.5.2.1)

- Spas and pools heated to more than 90 degrees must have side and bottom surfaces insulated to R-12



Electrical Power + Lighting

(Sections 8 and 9)

INTENT: REDUCE CONSUMPTION AND IMPROVE LIGHTING CONDITIONS THROUGH EFFICIENT LIGHTING PRODUCTS. REDUCE HEAT ADDED TO SPACES THAT MUST BE REMOVED BY AIR CONDITIONING.

Electrical Power + Lighting - Key Updates

Applicable new or modified definitions (DCMR 12I Section 3)

- Replaces primary and secondary side lighted area definition with a single side lighted area definition.

Electrical Power + Lighting

Key Requirements from 90.1 plus DC Amendments for:

- Lighting controls
- Interior lighting power
- Exterior lighting
- Electrical energy consumption

Electrical Power – Key Updates

Expanded application of automatic receptacles controls (8.4.2)

- 50% of all receptacles and one controlled receptacle to be located in each private office and at individual workstations at the desk area

Electrical Power – Key Updates

Requirements for energy metering (8.4.3)

- Metering required for all forms of energy delivered to the building, produced or recovered on or in the building or building site
- Load isolation and submetering requirements for projects 25,000 sq. ft. and larger such that following data can be collected:
 - HVAC system total energy use
 - Lighting system total energy use
 - Plug loads by devices, appliances and connected to convenience receptacles
 - Process loads (data centers, etc.)
 - Building operations and other miscellaneous loads (elevators, automatic doors etc.)
- Projects less than 25,000 sq. ft. need to be submeter-ready (i.e. provide adequate space for the future installation of submeters)

Electrical Power – Key Updates

Automatic Control of equipment in hotel and motel guest rooms (8.5.1)

- Hotels and motels with more than 50 guest rooms must include
 - Automatic switched outlet control that powers off lighting and outlets within 30 minutes of all occupants leaving room
 - Automatic television control that turns off TV, or places in sleep or standby mode within 30 minutes of all occupants leaving room

Lighting Systems – Key Updates

Efficient lighting for dwelling units (9.1.1)

- Dwelling units are only exempted from lighting requirements when 85% (increased from 75%) of lamps in permanently installed luminaires are high efficacy

Lighting Systems – Key Updates

Relaxed requirements for lighting alterations (9.1.2)

- Exemption for where alteration involves less than 50% (change from 10% in base 90.1-2013) of the connected lighting load in a space
- Amendment remains consistent with previous 2013 DCMR 12 exemption for lighting retrofits

Lighting Systems – Key Updates

calculation of luminaire wattage (9.1.4)

- Where lighting is connected to a current limiter and contains high efficacy luminaires, lamping shall be designed to use the wattage of the current limiter and not the labeled maximum wattage of the luminaire.

Lighting Systems – Key Updates

Automatic daylight controls for side lighting and top lighting (9.4.1.1)

- Applies new side lighting area definition
- Automatic daylight control is not required when the total interior light power (watts) is 20% better than the LPD using the building area or space-by-space method
- Threshold for requiring automatic daylighting controls in top lighting areas is lowered from 150 W to 105 W

Lighting Systems – Key Updates

Automatic shutoff control (9.4.1.1)

- Extends control requirements to restrooms, where all lighting shall automatically shut off within 30 minutes of all occupants leaving the space

Lighting Systems – Key Updates

Expanded prescriptive control requirements (9.5.2)

- Group R-1 occupancies with more than 50 guest rooms : Automatic control capable of turning off power of lighting in guest room after 30 minutes
- Commercial and industrial stack areas: Occupancy control capable of reducing lighting power by 50% within 20 minutes of occupants leaving area
- Egress and security lighting: Shall not exceed 0.1 W/ft². Any additional egress/security lighting shall be automatically control to turn off (language added to clarify how this provision has been being enforced in 2013 DC ECC)
- Exterior sign lighting: Must include controls to reduce power during night/off hours (language brought over from 2013 DC GCC)

Lighting Systems – Key Updates

Additional interior lighting power for retail areas (9.6.2)

- Separately controlled from general lighting and to be turned off during nonbusiness hours
- Revises the lighting power increase to be a flat percentage of the base power allowance
 - Retail Area 2 does not exceed 10% of the base power allowance
 - Retail Area 3 does not exceed 30% of the base power allowance
 - Retail Area 4 does not exceed 50%

Lighting Systems – Key Updates

Strikes additional lighting power option using non-mandatory controls (9.6.3)

- Additional power allowance no longer accepted for space types with nonmandatory controls

Lighting Systems – Key Updates

Exterior lighting control for uncovered parking areas (9.4.1.4.1)

- Automatic control that turns off luminaires during daylight hours and according to a timed scheduled
- Occupancy control required for luminaires mounted 24 ft or less above the ground and with a rated wattage of more than 50 W
 - Reduce power by at least 40% after 15 minutes of no activity

Lighting Systems – Key Updates

Several lower LPD's for building area method (see partial Table 9.5.1)

Building Area Type^a	LPD, W/ft.²
Automotive facility	0.80
Convention center	1.01
Courthouse	0.95
Dining: Bar lounge/leisure	1.01
Dining: Cafeteria/fast food	0.85
Dining: Family	0.90
Dormitory	0.54
Exercise center	0.79
Fire station	0.67
Gymnasium	0.94
Health-care clinic	0.85
Hospital	0.99
Hotel/Motel	0.87
Library	1.13
Manufacturing facility	1.17
Motion picture theater	0.76
Multifamily	0.48
Museum	1.02
Office	0.77

Lighting Systems – Key Updates

Several lower LPD's for the space-by-space method - Table 9.6.1

TABLE 9.6.1 Lighting Power Density Allowances Using the Space-by-Space Method and Minimum Control Requirements Using Either Method (Continued)

The control functions below shall be implemented in accordance with the descriptions found in the referenced paragraphs within Section 9.4.1.1. For each space type:

(1) All REQs shall be implemented.
 (2) At least one ADD1 (when present) shall be implemented.
 (3) At least one ADD2 (when present) shall be implemented.

Informative Note: This table is divided into two sections; this first section covers space types that can be commonly found in multiple building types. The second part of this table covers space types that are typically found in a single building type.

Common Space Types ¹	LPD, W/ft ²	RCR Threshold	Local Control (See Section 9.4.1.1[a])	Restricted to Manual ON (See Section 9.4.1.1[b])	Restricted to Partial Automatic ON (See Section 9.4.1.1[c])	Bilevel Lighting Control (See Section 9.4.1.1[d])	Automatic Daylight Responsive Controls for Sidelighting (See Section 9.4.1.1[e] ⁶)	Automatic Daylight Responsive Controls for Toplighting (See Section 9.4.1.1[f] ⁶)	Automatic Partial OFF (See Section 9.4.1.1[g] [Full Off complies])	Automatic Full OFF (See Section 9.4.1.1[h])	Scheduled Shutoff (See Section 9.4.1.1[i])
			a	b	c	d	e	f	g	h	i
Conference/Meeting/Multipurpose Room	1.10	6	REQ	ADD1	ADD1	REQ	REQ	REQ	—	REQ	—
Confinement Cells	0.81	6	REQ	ADD1	ADD1	REQ	REQ	REQ	—	ADD2	ADD2
Copy/Print Room	0.72	6	REQ	ADD1	ADD1	REQ	REQ	REQ	—	REQ	—
Corridor ²											
... in a facility for the visually impaired (and not used primarily by the staff) ³	0.92	width <8 ft	REQ	—	—	—	REQ	REQ	REQ	ADD2	ADD2
... in a hospital	0.99	width <8 ft	REQ	—	—	—	REQ	REQ	ADD2	ADD2	ADD2
... in a manufacturing facility	0.41	width <8 ft	REQ	—	—	—	REQ	REQ	—	ADD2	ADD2

Other Equipment

(Section 10)

INTENT: REDUCE CONSUMPTION WITH USE OF EFFICIENT EQUIPMENT AND APPLIANCES.

Other Equipment – Key Updates

Energy star rated new equipment (10.5.1)

- Applies to all projects and equipment not covered by federal appliance efficiency standards including:
 - Appliances - room air conditioners and water coolers
 - Heating and cooling equipment – thermostats and ventilation fans
 - Lighting – integral LED lamps
 - Commercial food service equipment – fryers; hot food holding cabinets; steam cookers; dishwashers; griddles; and ovens

Other Equipment – Key Updates

Energy star rated new equipment (10.5.2)

- Applies to projects following the alternate renewables approach and requires equipment covered by federal appliance efficiency standards including:
 - Appliances – clothes washers; dehumidifiers; dishwashers; refrigerators and freezers; room air conditioners
 - Residential heating and cooling equipment – ASHP's; boilers; central air conditioners; ceiling fans; dehumidifiers; warm air furnaces; and geothermal HP's
 - Residential water heaters
 - Lighting – lamps; luminaires; and light fixtures
 - Commercial food service equipment – refrigerators and freezers; and ice machines

Other Equipment – Key Updates

Programmable thermostat (10.5.3)

- Residential programmable thermostats must meet energy efficiency requirements published by NEMA

Other Equipment – Key Updates

Refrigerated display cases (10.5.4)

- All open refrigerated display cases must be covered by field installed strips, curtains or doors.

Construction and Plans for Operation (Section 11)

INTENT: COMMUNICATE INFORMATION CRITICAL TO THE CONSTRUCTION AND PLANS FOR OPERATION, INCLUDING THE COMMISSIONING PROCESS, BUILDING ACCEPTANCE TESTING, MEASUREMENT AND VERIFICATION, AND ENERGY USE REPORTING.

Construction – Key Updates

Commissioning was not required under 2013 DC Energy Conservation Code (ECC) but was required under 2013 DC Green Construction Code (GCC).

- 2017 DC Energy Conservation Code, commissioning requirements have been expanded to include all projects and have been removed from the DC GCC to eliminate redundancy.
- Section 11.3.1.2.1 no longer allows the CxA be a member of the any construction or design Firm.

Construction – Key Updates

Building acceptance testing (11.3.1.1)

- Prior to building permit, designate a project acceptance representative to lead, review, and overview acceptance testing activities
- Representative must review CD's to verify that relevant sensor locations, devices, and control sequences are properly documented
- Prior to building occupancy, provide verification of the proper installation and startup of systems, perform acceptance tests and verify that a systems operations and maintenance (O&M) manual has been prepared
- Conduct acceptance testing of the following:
 - Mechanical systems
 - Lighting systems
 - Fenestration systems
 - Renewable energy systems
 - Water measurement systems
 - Energy measurement systems

Construction – Key Updates

Project commissioning – Activities prior to building permit (11.3.1.2.1)

- The owner must contract with a project commissioning authority to lead, review and oversee completion of the Cx process activities prior to the completion of SD
- The owner and design team shall develop and update the Owners Project Requirements (OPR) document with the Cx team during the design phase as necessary.
- The design team shall develop the Basis of Design (BOD) document per ASHRAE Standard 55. Once the project is permitted – the BOD shall include the approved permit drawings and documents and any deviations shall be noted by the Cx agent as deficiency in their Cx reports unless updated and approved CD's are provided
- The Cx agent shall review both the OPR and BOD to ensure that there is no conflicting requirements
- Construction phase Cx requirements shall be incorporated into the project specifications and other CD's
- The Cx agent shall conduct two focused OPR reviews of the CD, the first near 50% design completion and the second prior to the delivery to the contractor

Construction – Key Updates

Project commissioning – Activities prior to building rough inspection completion (11.3.1.2.2)

- Develop and implement a Cx plan for testing of equipment, systems and controls
- Provide completed Cx plan to AHJ, project owner, GC for review

Construction – Key Updates

Project commissioning – Activities prior to building occupancy (11.3.1.2.3)

- Verify the installation and performance of the systems to be commissioned
- Verify that owners' requirements for the training of operating personal and building occupants is completed
- Complete preliminary Cx report, including acceptance testing and corrective measures taken
- Verify that the system manual has been prepared that includes O&M documentation
- A copy of the completed preliminary Cx report shall be reviewed and approved by the AHJ and provided to the owner

Construction – Key Updates

Project commissioning – Post occupancy activities (11.3.1.2.4)

- Complete any commissioning activities called out in the Cx plan for systems that can only be completed after building occupancy (trend logging, off season testing etc.)
- Verify that requirements for training operating personal and building occupants are completed for systems that were unable to be fully commissioned prior to building occupancy due to seasonal operation
- Complete a final Cx report and submit for approval within 180 days of project completion with all deficiencies identified in preliminary Cx report either corrected or signed off as an unresolved deficiency

Construction – Key Updates

Building envelope commissioning (11.3.1.3)

Applies to:

1. New construction and additions 50,000 sf or greater
2. Alterations and/or additions for buildings over 50,000 sq ft where at least 25% of the vertical, above-grade building envelope is being replaced, altered and/or added.

Construction – Key Updates

Building envelope commissioning (11.3.1.3)

- Whole building pressurization testing shall be conducted with the measured air leakage rate of the envelope not exceeding 0.25 cfm/ft² (@ 75 Pa)
 - Multifamily building may utilize compartmentalization testing of individual tenant spaces and not exceed 0.30 cfm/ft² (@ 50 Pa)
- A building commission authority with envelope commissioning credentials shall be contracted by the owner to conduct building air-barrier commissioning prior to permit and provide the following:
 - Design review prior to permit application to assess the design documentation of the air barrier, its continuity and constructability. Results and documentation of this review shall be included with permit drawings
 - Incremental field inspections and testing of air-barrier components
 - Development of envelope commissioning program and plan (per ASTM-E2813-12) that shall be provided to the AHJ prior to building envelope installation
 - Final envelope commissioning report shall be submitted to the AHJ for review at or prior to final inspection

Renewable Energy

(Section 13)

INTENT: ASSESS AND PROVIDE RENEWABLE ENERGY SYSTEMS ONSITE WHENEVER POSSIBLE.



Renewable Energy Systems – Key Updates

Projects larger than 10,000 sq ft, including new building, additions and alterations level 3 must include onsite renewable energy systems that meet one of the following when following the prescriptive path:

- Standard renewable approach (13.1.1.1)
- Alternative renewables approach (13.1.1.2)
- Or demonstrate that the annual daily average incident solar radiation is less than 1.2 kBtu/ft²/day and a commitment to purchase renewable electricity products of a least 7 kWh/ft² of conditioned space for each year until the cumulative purchase totals 70 kWh/ft² of conditioned space

Renewable Energy Systems – Key Updates

Standard renewables approach (13.1.1.1)

- Project shall contain on-site renewable energy systems that provide the annual energy production equivalent to:
 - For single story buildings - 6.0 kBtu/ft² multiplied by the gross roof area
 - For all other buildings – 10.0 kBtu/ft² multiplied by the gross roof area

Renewable Energy Systems – Key Updates

Alternate renewables approach (13.1.1.2)

- Higher efficient equipment reduces the requirement per Section 10.5.2
- Contain on-site renewable energy systems that provide the annual energy production equivalent to:
 - For single story buildings - 4.0 kBtu/ft² multiplied by the gross roof area
 - For all other buildings – 7.0 kBtu/ft² multiplied by the gross roof area

Net-Zero Energy Compliance Path (Appendix Z)

INTENT: PROVIDE AN OPTIONAL ALTERNATIVE COMPLIANCE PATH FOR PROJECT WISHING TO TARGET ZERO ENERGY LEVELS OF PERFORMANCE.

Net-Zero Energy Compliance Path

Minimum performance requirements (Z2)

- Has a maximum annual heating demand of 4.2 kBtu/ft²
- Has a maximum annual cooling demand of 6.4 kBtu/ft²
- Submit with the permit application documentation that the building design has achieved a Zero Energy Performance Index (zEPI) of 30 or lower
- Has conducted a whole building pressurization test in accordance with Section 11.3.1.3a (not exceeding 0.25 cfm/ft² (@ 75 Pa))

Net-Zero Energy Compliance Path

Energy systems (Z3)

- On-site combustion of fossil fuels for thermal energy is not permitted
- Renewable energy systems shall provide renewable energy equal to the modeled EUI of the building
 - Onsite renewable energy - shall be generated wherever feasible before procuring offsite renewable energy. Project must demonstrate one of the following:
 - a. A min of 5% of the total building energy consumption shall first be met by an acceptable source of renewable energy installed on the building roof or site
 - b. For project with PV systems, a min of 25% of the total site area shall be allocated for energy generating system
 - Procurement of off-site renewable energy – a 5-year contract for generation in DC/MD/VA from a qualified supplier providing energy from Tier 1 renewable sources meeting the min percentages of the DC RPS

Net-Zero Energy Compliance Path

Energy metering, monitoring and reporting (Z4 & Z5)

- Requires metering of all forms of energy delivered to the site, flow rates for all centrally ventilated building systems and consideration of onsite energy storage options.
- Project must submit data within 24 months of occupancy demonstrating 12 continuous months of operation (at no less than 90% occupancy) where the energy consumed by the building is equal to or less than the renewable energy associated with the building.

Resources

- Energy and Green Workbooks and “how to use” Videos
<https://dcra.dc.gov/service/energy-and-green-building>
- DC Integrated 2017 Building, Energy and Green Codes
<https://dcra.dc.gov/page/dc-construction-codes>
- **Contact Us** – In the **Subject Line** include “**Commercial Energy**”
dcra@dc.gov



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