2012 International Energy Conservation Code Commercial Provisions

The Three Cs

Presented by:
Fred Wajcs, P.E.
Energize Connecticut

D.E.S.I.G.N and TRADES CONFERENCE 2016 • 15TH ANNUAL

Construction Institute

2012 IECC – Commercial Provisions

The Three Cs

- Compliance
- Commissioning
- Completion

2

2012 IECC – Commercial Provisions

Scope and Intent

- **Scope**
  - Buildings
  - Building Sites
  - Associated systems and equipment
- **Intent**
  - Regulate design and construction
  - Effective use and conservation of energy
  - Over useful life of each building

3

2012 IECC – Commercial Provisions

Compliance

- **New Construction (one of)**
  1. **ASHRAE/IESNA Standard 90.1-2010**
  2. **2012 IECC**
     - Standard requirements
     - Plus at least one additional efficiency option
  3. **Total Building Performance**
     - Mandatory requirements
     - Energy cost 85% of standard reference design
- **Existing Buildings**
  - Applicable standard requirements
  - ASHRAE/IESNA Standard 90.1-2010

4

2012 IECC – Commercial Provisions

Compliance

- **Additional Efficiency Package Option**
  1. Efficient HVAC performance
  2. Efficient lighting system (building area method)
  3. On-site supply of renewable energy
     - Rated energy output per square foot, or
     - Energy use per year
- **Automatic Daylighting Controls Required**
  - Increased vertical fenestration area
  - Increased skylight area
  - Increased U-factor and/or SHGC

5

Compliance Path Comparison

Comparison of Commercial Building Performance Characteristics Between 2009 and 2012 International Energy Conservation Code and ASHRAE/IESNA Standard 90.1-2010 For Climate Zone 5A

	Chapter 5 2009 IECC	Commercial Provisions 2012 IECC	ASHRAE/IESNA Standard 90.1-2010
Administration			
		Regulate the design and construction of buildings for the effective use and conservation of energy over the useful life of each building	Establish the minimum energy efficiency requirements for design, construction and a plan for operation and maintenance; and for utilization of on-site, renewable energy resources.
Scope		Applies to commercial buildings and the buildings sites and associated systems and equipment	Expanded to New Equipment or Building Systems Specifically Identified As Part of Industrial or Manufacturing Processes
Applicability	New Construction and Additions, Alterations, Renovations or Repairs to Existing Building Systems or Portions Thereof Shall Conform as Related to New Construction	New Construction and Additions, Alterations, Renovations or Repairs to Existing Building Systems or Portions Thereof Shall Conform as Related to New Construction	New Buildings and Additions to and Alterations of Existing Buildings; Replacement of Portions of Exisitng Buildings
	Change Resulting in In Increased Energy Use Must Comply	Change Resulting in In Increased Energy Use Must Comply	
Change of Ocupancy	LPD Must Comply With Change from One Lighting Area or Space Type to Another Area or Space Type	LPD Must Comply With Change from One Lighting Area or Space Type to Another Area or Space Type	

Located at
http://ctashrae.org/Codes

6

Why Compliance Documentation?

- Code requirements
- Facilitates permit review
  - Design professionals
  - Building officials
- Communicates code compliance and project requirements to:
  - Building officials
  - Contractors and sub contractors
  - Suppliers

7

2012 IECC – Commercial Provisions

Information on Construction Documents

- Insulation materials and their R-values
- Fenestration U-factors and SHGCs
- Area-weighted U-factor and SHGC calculations
- Mechanical system design criteria
- Mechanical and service water heating system and equipment types, sizes and efficiencies
- Economizer description
- Equipment and systems controls
- Fan motor horsepower (hp) and controls
- Duct sealing
- Duct and pipe insulation and location
- Lighting fixture schedules with wattage and control narrative
- Air seal details

8

2012 IECC – Commercial Provisions

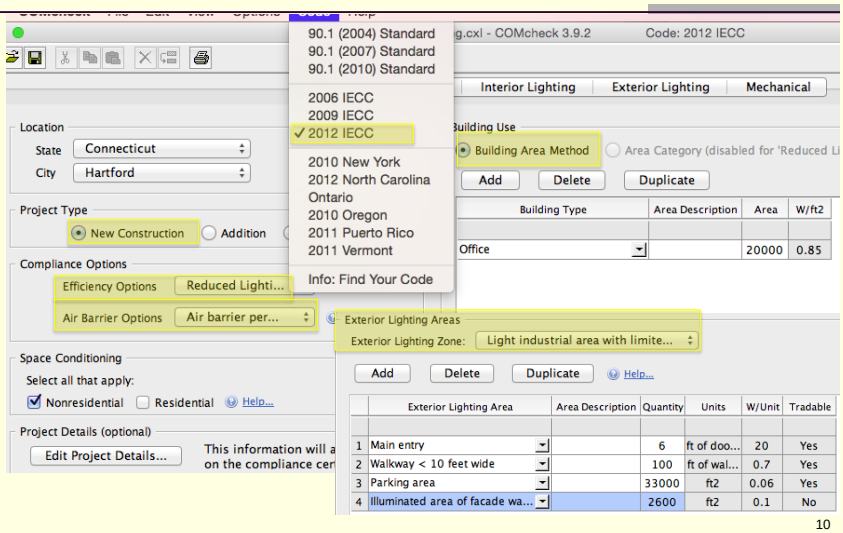
Compliance Documentation

- Identify the code to be complied with
- Approaches
  - Requirements scattered throughout the construction documents
  - COMcheck
  - AIA Connecticut sample documentation
  - Other Forms
    - Codes/standards organization
    - US Department of Energy
    - Developed by designer or design professional

9

Compliance Documentation

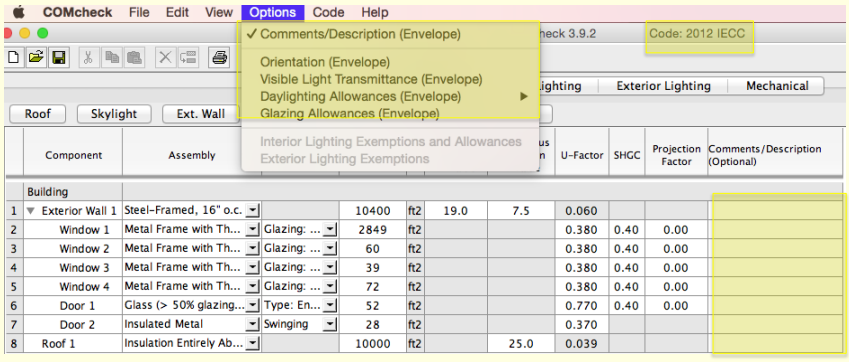
COMcheck Inputs



10

Compliance Documentation

COMcheck Inputs

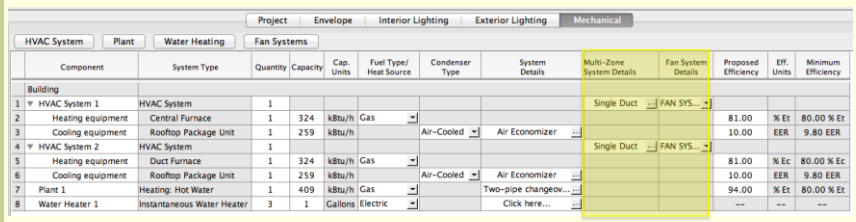


	Component	Assembly						U-Factor	SHGC	Projection Factor	Comments/Description (Optional)
	Building										
1	Exterior Wall 1	Steel-Framed, 16" o.c.		10400	ft2	19.0	7.5	0.060			
2	Window 1	Metal Frame with Th...	Glazing: ...	2849	ft2			0.380	0.40	0.00	
3	Window 2	Metal Frame with Th...	Glazing: ...	60	ft2			0.380	0.40	0.00	
4	Window 3	Metal Frame with Th...	Glazing: ...	39	ft2			0.380	0.40	0.00	
5	Window 4	Metal Frame with Th...	Glazing: ...	72	ft2			0.380	0.40	0.00	
6	Door 1	Glass (> 50% glazing...	Type: En...	52	ft2			0.770	0.40	0.00	
7	Door 2	Insulated Metal	Swinging	28	ft2			0.370			
8	Roof 1	Insulation Entirely Ab...		10000	ft2		25.0	0.039			

11

Compliance Documentation

COMcheck Inputs



	Component	System Type	Quantity	Capacity	Cap. Units	Fuel Type/ Heat Source	Condenser Type	System Details	Multi-Zone System Details	Fan System Details	Proposed Efficiency	Eff. Units	Minimum Efficiency
	Building												
1	HVAC System 1	HVAC System	1						Single Duct	FAN SYS...			
2	Heating equipment	Central Furnace	1	324	kBtu/h	Gas					81.00	% Et	80.00 % Et
3	Cooling equipment	Rooftop Package Unit	1	259	kBtu/h		Air-Cooled	Air Economizer			10.00	EER	9.80 EER
4	HVAC System 2	HVAC System	1						Single Duct	FAN SYS...			
5	Heating equipment	Duct Furnace	1	324	kBtu/h	Gas					81.00	% Ec	80.00 % Ec
6	Cooling equipment	Rooftop Package Unit	1	259	kBtu/h		Air-Cooled	Air Economizer			10.00	EER	9.80 EER
7	Plant 1	Heating: Hot Water	1	409	kBtu/h	Gas		Two-pipe changeov...			94.00	% Et	80.00 % Et
8	Water Heater 1	Instantaneous Water Heater	3	1	Gallons	Electric		Click here...			--	--	--

12

Compliance Documentation

COMcheck Inputs

Project | Envelope | Interior Lighting | Exterior Lighting | Mechanic

Add Fixture | Fixture Library

	Component	Fixture ID	Fixture Description	Lamp Description / Wattage Per Lamp	Ballast	Lamps Per Fixture	Number of Fixtures	Fixture Wattage	Track Lighting Wattage
	Building	Allowed wattage = 17000 Proposed wattage = 14922							
1	Office (20000 sq.ft.)	Allowed wattage = 17000 Proposed wattage = 14922							
2	Linear Fluorescent 1			48" T8 32W (Su...	Premiu...	2	210	56.0	
3	Linear Fluorescent 2			24" T8 17W	Premiu...	2	70	29.0	
4	LED 1			LED PAR 17W		1	60	17	
5	Linear Fluorescent 3			48" T8 32W (Su...	Premiu...	1	4	28.0	

Project | Envelope | Interior Lighting | Exterior Lighting | Mechanical

Add Fixture | Fixture Library

	Component	Fixture ID	Fixture Description	Lamp Description / Wattage Per Lamp	Ballast	Lamps Per Fixture	Number of Fixtures	Fixture Wattage	Track Lighting Wattage
	Exterior Lighting Areas:	Tradable Wattage: Allowed = 2170 Proposed = 2300 Supplemental wattage: 600 (see Help for details)							
1	Main entry (6 ft of door width)	Tradable Wattage: Allowed = 120 Proposed = 40							
2	LED 1			LED Other Fixtur...		1	2	20	
3	Walkway < 10 feet wide (100 f	Tradable Wattage: Allowed = 70 Proposed = 250							
4	LED 2			LED Other Fixtur...		1	10	25	
5	Parking area (33000 ft2)	Tradable Wattage: Allowed = 1980 Proposed = 2010							
6	LED 3			LED Roadway-P...		1	30	67	
7	Illuminated area of facade wall	Non-tradable Wattage: Allowed = 260 Proposed = 450							
8	HID 1			Ceramic Metal H...	Pulse st...	1	6	75.0	

Compliance Documentation

COMcheck Report

COMcheck Software Version 3.9.2

Envelope Compliance Certificate

2012 IECC

Section 2: General Information

Building Location (for weather data): **Hartford, Connecticut**
Climate Zone: **5a**
Building Type for Envelope Requirements: **Nonresidential**
Vertical Glazing / Wall Area Pct.: **30%**

Building Type	Floor Area
Office	20000

Section 3: Requirements Checklist

Envelope PASSES: Design 0.1% better than code.

Climate-Specific Requirements:

Component Name/Description	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U-Factor(a)
Exterior Wall 1: Steel-Framed, 16" o.c.	10400	19.0	7.5	0.060	0.064
Window 1: Metal Frame with Thermal Break:Double Pane, Clear, Fixed, SHGC 0.40	2849	---	---	0.380	0.380
Window 2: Metal Frame with Thermal Break:Double Pane, Clear, Fixed, SHGC 0.40	60	---	---	0.380	0.380
Window 3: Metal Frame with Thermal Break:Double Pane, Clear, Fixed, SHGC 0.40	39	---	---	0.380	0.380

14

Compliance Documentation

COMcheck Report

COMcheck Software Version 3.9.2
Envelope Compliance Certificate
2012 IECC

Air Leakage, Component Certification, and Vapor Retarder Requirements:

- ☐ 1. Continuous air barrier is provided throughout the building thermal envelope.
- ☐ 2. Air barrier joints and seams are sealed. The joints and seals are securely installed in or on the joint for its entire length.
- ☐ 3. Penetrations of the air barrier and paths of air leakage are caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Joints and seals are sealed in the same manner or taped or covered with a moisture vapor-permeable wrapping material. The joints and seals are securely installed in or on the joint for its entire length.
- ☐ 4. The air barrier is continuous for all assemblies that are the thermal envelope and across the joints and assemblies.
- ☐ 5. Recessed lighting fixtures installed in the building envelope are Type IC rated as meeting ASTM E283, tested to <=2.0 cfm, and are sealed with gasket or caulk.
- ☐ 6. Materials making up the air barrier have air permeability <=0.004 cfm/ft2 or are qualifying materials as per Section C402.4.1.2.1.
- ☐ 7. Air leakage of fenestration. Windows/non-glazed sliding and swinging doors/skylights with no weepage openings <= 0.20 cfm/ft2. Skylights with weepage <= 0.30 cfm/ft2. Curtain walls/storefront glazing <= 0.06 cfm/ft2. Doors: glazed swinging entrance/revolving/rolling <= 1.00 cfm/ft2. Doors: garage <= 0.40 cfm/ft2.

  Exceptions:

  - ☐ Field-fabricated assemblies.

- ☐ 8. Doors and access openings from conditioned space to shafts, chutes stairways and elevator lobbies are gasketed, weatherstripped or sealed.

  Exceptions:

  - ☐ Door openings required to comply with International Building Code as per Section C402.4.4.

- ☐ 9. Stairway and shaft vents are provided with Class I motorized dampers with a leakage rate <= 4 cfm/ft2. Dampers are installed with controls so that they are capable of automatically opening upon activation of any fire alarm or the interruption of power to the damper.
- ☐ 10. Outdoor air supply and exhaust openings are provided with Class IA motorized dampers having a leakage rate <=4 cfm/ft2.

15

Compliance Documentation

COMcheck Report

COMcheck Software Version 3.9.2
Interior Lighting Compliance Certificate
2012 IECC

Section 3: Interior Lighting Fixture Schedule

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
Office (20000 sq.ft.)				
Linear Fluorescent 1: 1: 2x4 Troffer: 48" T8 32W (Super T8): Premium efficiency:	2	210	56	11760
Linear Fluorescent 2: 2a: 2x2 Troffer: 24" T8 17W: Premium efficiency:	2	70	30	2100
Linear Fluorescent 3: 2b: 2x2 Troffer: 24" T8 17W: Premium efficiency:	2	70	28	1960
Linear Fluorescent 4: 4: 1x4 Wall Mount: 48" T8 32W (Super T8): Premium efficiency:	1	4	28	112
LED 1: 3: 6" Downlight: LED Other Fixture Unit 16W:	1	30	16	480
			Total Proposed Watts =	16412

Section 4: Requirements Checklist

Lighting Wattage:

- ☐ 1. Total proposed watts n
  Allowed Wattage: 1700
  Complies: YES

Mandatory Requiren

- ☐ 2. Dwelling units (comple
  requirements of this co
  high efficacy lamps.
- ☐ 3. Manual Controls: Each
  and indicate on/off stat

Additional Efficiency Package Requirements:

- ☐ 1. The reduced interior lighting power option has been selected as the additional efficiency package required by this energy code. Requirements for this package are applied to the interior lighting allowance calculations. Full compliance with this efficiency option requires inspection and verification that the interior lighting allowances and fixture schedule are compliant and deemed to pass.

Interior Lighting PASSES: Design 3% better than code.

Section 5: Compliance Statement

Compliance Statement: The proposed lighting design represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed lighting system has been designed to meet the 2012 IECC requirements in COM*check* Version 3.9.2 and to comply with the mandatory requirements in the Requirements Checklist.

Name - Title _____ Signature _____ Date _____

16

Compliance Documentation

COMcheck Report

COMcheck Software Version 3.9.2
Mechanical Compliance Certificate
2012 IECC

Section 3: Mechanical Systems List

Quantity	System Type & Description
1	HVAC System 1 (Multiple-Zone) : Heating: 1 each - Central Furnace, Gas, Capacity = 324 kBtu/h Proposed Efficiency = 81.00% Et, Required Efficiency = 80.00% Et Cooling: 1 each - Rooftop Package Unit, Capacity = 259 kBtu/h, Air-Cooled Condenser, Air Economizer Proposed Efficiency = 10.00 EER, Required Efficiency = 9.80 EER Fan System: FAN SYSTEM 2 I Second Floor -- Compliance (Motor nameplate HP method) : Passes Fans: FAN 1 Supply, Multi-Zone VAV, 8000 CFM, 5 motor nameplate hp
1	HVAC System 2 (Multiple-Zone) : Heating: 1 ea Proposed E Cooling: 1 ea Proposed E Fan System: Fans: FAN 1 Sup
1	Plant 1: Heating: Hot Proposed E
3	Water Heater Electric Instan No minimu

Section 4: Re

Requirements S

☐ 1. Equipment minim

Section 5: Compliance Statement

Compliance Statement: The proposed mechanical design represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 2012 IECC, Chapter 8, requirements in COM*check* Version 3.9.2 and to comply with the mandatory requirements in the Requirements Checklist.

Name - Title | Signature | Date

Section 6: Post Construction Compliance Statement

☐ HVAC record drawings of the actual installation, system capacities, calibration information, and performance data for each equipment provided to the owner.

☐ HVAC O&M documents for all mechanical equipment and system provided to the owner by the mechanical contractor.

☐ Written HVAC balancing and operations report provided to the owner.

The above post construction requirements have been completed.

Principal Mechanical Designer-Name | Signature | Date

Compliance Documentation

COMcheck Report

COMcheck Software Version 3.9.2
Mechanical Compliance Certificate
2012 IECC

Requirements Specific To: HVAC System 2 :

☐ 1. Equipment minimum efficiency: Duct Furnace (Gas): 80.00 % Ec
☐ 2. Equipment minimum efficiency: Rooftop Package Unit: 9.80 EER (9.9 IPLV)
☐ 3. Minimum one temperature control device per zone
☐ 4. Integrated air economizer is required for individual cooling systems and allows modulation of outdoor air and return air dampers to provide up to 100% of the design supply air quantity as outdoor air for cooling. All air economizers shall be capable of automatically reducing outdoor air intake to the design minimum outdoor air quantity when outdoor air intake will no longer reduce cooling energy usage.
☐ 5. Air economizer dampers can be sequenced with the cooling equipment and not controlled exclusively by mixed air temperature.
Exception(s):
☐ System controlled from space temperature (such as single-zone systems).
☐ 6. Cooling system provides a means to relieve excess outdoor air during economizer operation.
☐ 7. Systems serving more than one zone must be VAV systems
☐ 8. Single-duct VAV terminals reduce primary air before reheating
☐ 9. Controls capable of resetting supply air temp (SAT) by 25% of SAT-room temp difference
Exception(s):
☐ Systems that prevent reheating, recooling or mixing of heated and cooled supply air
☐ Seventy five percent of the energy for reheating is from site-recovered or site solar energy sources.
☐ Zones with peak supply air quantities of 300 cfm (142 L/s) or less.
☐ 10. Hot gas bypass prohibited unless system has multiple steps of unloading or continuous capacity modulation
☐ 11. Hot gas bypass limited to 25% of total cooling capacity
☐ 12. VAV fans with static pressure sensors are located so that controller setpoint is no more than one-third of the total design static pressure. For ducts with major splits, at least one sensor is located on each major branch.
☐ 13. Systems with DDC of individual zone boxes reporting to the central control panel has static pressure setpoint reset based on the zone requiring the most pressure.

18

Compliance Documentation

AIA CT Sample Documentation

http://aiact.org/about-aia-connecticut/committees/building-performance-regulations/

Building Performance & Regulations
AIA Connecticut Committees

Compliance Forms

2009 International Energy Conservation Code Sample Compliance Forms

- Connecticut 90.1-2007 Compliance (Excel 97-2003 format)
- Connecticut 90.1-2007 ECB Compliance (Excel 97-2003 format)
- Connecticut 2009 IECC Compliance (Excel 97-2003 format)
- Connecticut 2009 IECC TBP Compliance (Excel 97-2003 format)
- Instructions for Compliance Spreadsheet May 19 2011

19

Compliance Documentation

AIA CT Sample Documentation

See the instructions and disclaimer for this spreadsheet.	Element	Commercial Chapter 4 [CE] 2012 IECC Requirement	Values In Simulation for Proposed Building Design	Values Incorporated Into This Design
Total Building Performance, Annual Energy Cost	For Standard Reference Design Building			
Compliance is demonstrated when the proposed building's energy cost is equal to or less than 85 percent of the standard reference design building's energy cost.	For Proposed Design Building			

See the instructions and disclaimer for this spreadsheet.	Element	Commercial Chapter 4 [CE] 2012 IECC Requirement	Values Incorporated Into This Design
Section C401 Application			
Compliance with C402, C403, C404 and C405 **AND** (either C406.2, C406.3 or C406.4)	New Construction		
Compliance with C402, C403, C404 or C405	Existing Building		
Section C402 Building Envelope (Climate Zone 5A)			
Space-Conditioning Category (Nonresidential or Residential)			
Gross Roof Area			
Roofs: Maximum Assembly U-factor	Insulation Entirely Above Deck		
	Metal Building		
	Attic & Other		
Minimum Insulation R-Value	Insulation Entirely Above Deck		
	Metal Building		

20

Compliance Documentation

AIA CT Sample Documentation

Section C402 Building Envelope (Climate Zone 5A)			
Space-Conditioning Category (Nonresidential or Residential)			
Gross Roof Area			
Roofs: Maximum Assembly U-factor			
Minimum Insulation R-Value			
Walls: Above-Grade: Maximum Assembly U-factor			
Above-Grade: Minimum Insulation R-Value			
Below-Grade: Maximum Assembly C-factor			
Below-Grade: Minimum Insulation R-Value			
Floors: Maximum Assembly U-factor			
Minimum Insulation R-Value			
Slab-On-Grade - Maximum Assembly F-factor			
Slab-On-Grade - Minimum Insulation R-Value			
Opaque Doors:			
Maximum Assembly U-factor			
Maximum Assembly R-Value			
Radiant Heating System Insulation			
Gross Wall Area			
Total Vertical Fenestration Area			
Vertical Glazing: Percent of Wall Area			
Increased Vertical Fenestration Area with Daylighting Control			
Vertical Glazing			
Maximum Assembly U-factor			
Maximum Assembly Solar Heat Gain Coefficient			
Increased Skylight Area with Daylighting Controls			
Required Minimum Skylight Fenestration Area with Daylighting Control			
Total Skylight Area			
Skylight: Percent of Roof Area			

21

Compliance Documentation

AIA CT Sample Documentation

Section C402 Building Envelope (Climate Zone 5A)			
Space-Conditioning Category (Nonresidential or Residential)		Nonresidential	
Gross Roof Area			10,000
Roofs: Minimum Insulation R-Value	Insulation Entirely Above Deck	25ci	25ci
Walls: Above-Grade: Minimum Insulation R-Value	Metal Framed	R-13 + R-7.5ci	R-19 + R-7.5ci
Floors: Slab-On-Grade, Minimum Insulation R-Value	Unheated Slab	R-10 for 24"	R-10 for 24"
Opaque Doors:			
Maximum Assembly U-factor	Swinging	0.37	0.37
Gross Wall Area			10,400
Total Vertical Fenestration Area			3,072
Vertical Glazing: Percent of Wall Area		30%	29.5%
Vertical Glazing			
Maximum Assembly U-factor	Fixed Fenestration	0.38	0.38
	Entrance Door	0.77	0.77
Maximum Assembly Solar Heat Gain Coefficient	Fixed Fenestration	0.40	0.40
	Entrance Door	0.40	0.40
Total Skylight Area			0
Skylight: Percent of Roof Area		3%	0%
Air Barriers:			
Construction	Continuous with Sealed Joints and Seams	Required	Specified, see Drawing A-zz
Compliance Option	Materials	Required as Listed	Specified, see Drawing A-zz
Penetration Sealing	Caulked, Gasketed or Otherwise Sealed	Required	Specified, see Drawing A-zz
Maximum Assembly Air Infiltration Rates	Windows	0.20 cfm/sf	0.20 cfm/sf
	Swinging Doors	0.20 cfm/sf	0.20 cfm/sf

22

Compliance Documentation

AIA CT Sample Documentation

Section C403 Heating, Ventilating and Air Conditioning				
Calculated Load		Heating		700 MBH
		Cooling		520 MBH
Equipment Output Capacity	(RTU provides after hour heating)	Heating		648 MBH
		Cooling		517.8 MBH
HVAC Equipment Performance				
Unitary Air Conditioners, Electrically Operated, Minimum Efficiency				
	Air Cooled with Other Than Electric Heating	≥135,000 Btu/h and <240,000 Btu/h	10.8 EER / 11.0 IEER	
		≥240,000 Btu/h and <760,000 Btu/h	10.0 EER / 10.1 IEER	258.9 MBH 10.0 EER / 12.3 IEER
Warm Air Furnaces, Minimum Efficiency	Gas Fired	≥225,000 Btu/h	80%	81%
Boilers, Hot Water, Minimum Efficiency	Gas Fired	≥300,000 Btu/h and ≤2,500,000 Btu/h	80%	94%
Economizers				
Airside (with Relief of Excess Outdoor Air), Capacity		Rooftop AC Units	Required on Systems ≥33,000 Btu/h	Specified, see drawing M-xx
HVAC System Control				
Zone Thermostatic Control		Each Zone	Required	Specified, see drawing M-xx
Independent Perimeter System Thermostatic Control		Each Exposure	Required	Specified, see drawing M-xx
Setpoint Deadband (Overlap Restriction)		All Thermostatic Controls	5° Deadband	5° Deadband
Automatic Off-Hour Setback and Shutdown Zone Control		Operating Range	55° to 85°	55° to 85°
		Different Daily Schedules	7 different daily schedules per	7 different daily schedules per

23

Compliance Documentation

AIA CT Sample Documentation

Section C405 Electrical Power and Lighting				
Building Type				Office
Gross Lighted Floor Area				20,000
Interior Lighting Power Allowance		Allowance	17,000	
		Connected		16,412
Equivalent Interior Lighting Power Density by Building Area Method			0.85	0.82
Interior Lighting Controls				
Enclosed Area Lighting Controls		Each Enclosed Area	Manual Switching	
Light Reduction Controls		Entire Building	Required to Achieve ≥50% load Reduction	Specified, see Drawing E-yy
Automatic Building Time Switch Controls		Entire Building	All Except Ones Controlled by Occupancy Sensing Device	Specified, see Drawing E-yy
Occupancy Sensors in Required Areas (Manual On or Automatic On to 50% Power)		Conference/Meeting Rooms	Required	Specified, see Drawing E-yy
		Employee Lunch & Break Rooms		
		Private Offices		
		Restrooms		
		Storage Rooms		
		Janitorial Closets		
		Spaces ≤300 sq. Ft. enclosed by Floor-to-Ceiling Height Partitions		
Daylight Zone Controls		Manual Controls	Required	Specified, see Drawing E-yy

24

Compliance Documentation

AIA CT Sample Documentation

Section C408 System Commissioning			
Mechanical Systems Commissioning and Completion Requirements			
Commissioning Plan	Narrative Description of Activities	Required	Specified
	Listing of Equipment, Appliances or Systems To Be Tested		
	Functions To Be Tested		
	Test Conditions		
	Measurable Criteria for Performance		
Air System Balancing		Required	Specified
Hydronic System Balancing		Required	Specified
Functional Performance Testing	Equipment in All Modes of Operation	Required	Specified
	Equipment in Redundant or Automatic Back-up Mode		
	Equipment Performance Alarms		
	Upon Loss and Restoration of Power		
	Controls		
	Economizers		
Preliminary Commissioning Report	Provided to Owner	Required	Specified

25

2012 IECC – Commercial Provisions

Building Commissioning

- Process that verifies and documents:
  - Selected building systems
    - Designed
    - Installed
    - Function
  - According to
    - Owner's project requirements
    - Construction documents
    - Minimum code requirements

26

2012 IECC – Commercial Provisions

Building Commissioning

- Construction documents indicate
  - Commissioning requirements
  - Completion requirements
- Commissioning documents
  - Given to owner
  - Available to building official

27

2012 IECC – Commercial Provisions

Building Commissioning

Prior to passing final mechanical inspection

- Registered design professional shall provide
  - Evidence of mechanical system commissioning
  - Evidence of completion
- Building official receives letter from building owner acknowledging receipt of Preliminary Commissioning Report

28

2012 IECC – Commercial Provisions

Building Commissioning

Mechanical systems commissioning

- Required when:

  Total mechanical equipment capacity in building:

  - ≥480,000 Btu/h cooling capacity, and
  - ≥600,000 Btu/h heating capacity

- Exception for systems serving
  - Dwelling units
  - Sleeping units in hotels, motels, boarding houses, or similar units

29

2012 IECC – Commercial Provisions

Building Commissioning

- Commissioning plan
  - Narrative description of activities
  - List of specific equipment, appliances or systems to be tested and description of tests to be performed
  - Functions to be tested
  - Conditions at which tests will be performed
  - **Measurable performance criteria**

30

2012 IECC – Commercial Provisions

Building Commissioning

- Systems adjusting and balancing
  - Air system balancing
  - Hydronic system balancing

31

2012 IECC – Commercial Provisions

Building Commissioning

- Functional performance testing
  - Equipment (components, systems and system-to-system interfacing)
    - All modes in sequence of operation
    - Redundant or automatic back-up mode
    - Performance of alarms; and
    - Operation upon loss of power and restoration of power
  - Controls
  - Economizers

32

2012 IECC – Commercial Provisions

Building Commissioning

Preliminary commissioning report

- Completed & certified by registered design professional or approved agency
- Identifies:
  - Deficiencies that have not been corrected
  - Deferred tests because of climate conditions
  - Climate conditions for deferred tests
- Acceptance of report
  - Letter from building owner acknowledging receipt

33

2012 IECC – Commercial Provisions

Building Commissioning

Lighting system functional testing

- Ensures controls are:
  - Calibrated
  - Adjusted
  - Programmed
  - In proper working order
- Required procedures
  - Confirm placement, sensitivity and time-out adjustments for occupancy sensors
  - Confirm time and scheduling for time dependent controls
  - Confirm placement and sensitivity adjustments for photosensor control

34

2012 IECC – Commercial Provisions

Completion

Documentation requirements

Provided to building owner within 90 days of receipt of CO

- Drawings
  - Location of each piece of equipment
  - Performance data on each piece of equipment

35

2012 IECC – Commercial Provisions

Completion

Documentation requirements (continued)

- Manuals
  - Submittal data
  - Manufacturer's operation manuals and maintenance manuals
  - Name and address of service agency
  - HVAC controls system maintenance and calibration information
  - Narrative of how each system is intended to operate

36

2012 IECC – Commercial Provisions

Completion

Documentation requirements (continued)

- System balancing report
- Final commissioning report
  - Functional performance tests results
  - Disposition of deficiencies including used or proposed corrective measures
  - Functional performance test procedures

37

Thank You!

Further Questions and/or Discussions

Frederick F. Wajcs, Jr., P.E.
860-644-5150 wajcsff@cox.net

energize CONNECTICUT
Empowering you to make smart energy choices

EVERSOURCE ENERGY

UIL HOLDINGS COMPANIES

38