

MAKING THE TRANSITION FROM IECC 2009/2012 TO 2015



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I-LinCP Forum 2017

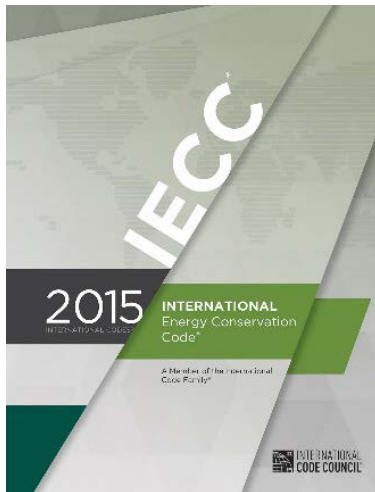
- Code Overview
- How each discipline is affected by IECC 2015:
 - Architectural
 - Mechanical
 - Electrical
- Code comparisons in regards to efficiencies—and what this means to owners and A/E/C industry

**SECO (State Energy Conservation Office) adopted 2015 IECC
Effective November 1, 2016**

Code History

Effective Dates	Codes
Prior to 1999	Texas had no mandatory statewide energy code.
Sept. 1, 2001 – Mar. 31, 2011	2000 IECC with 2001 Supplement
Apr. 1, 2011 – Oct. 31, 2016	2009 IECC
Nov. 1, 2016	2015 IECC

Divided into Commercial and Residential Sections by Chapters:



Chapter 1 – Scope and Admin

Chapter 2 – Definitions

Chapter 3 – General Requirements

Chapter 4 – Energy Efficiency

Chapter 5 – Existing Buildings

Chapter 6 – Referenced Standards

12 PIECES REQUIRED



1. Insulation materials and R-values
2. Fenestration U-factors and solar heat gain coefficients
3. Area-weighted U-factor and solar heat gain coefficient calcs
4. Mechanical system design criteria
5. Mechanical and service water heating system and equipment types, sizes and efficiencies
6. Economizer description

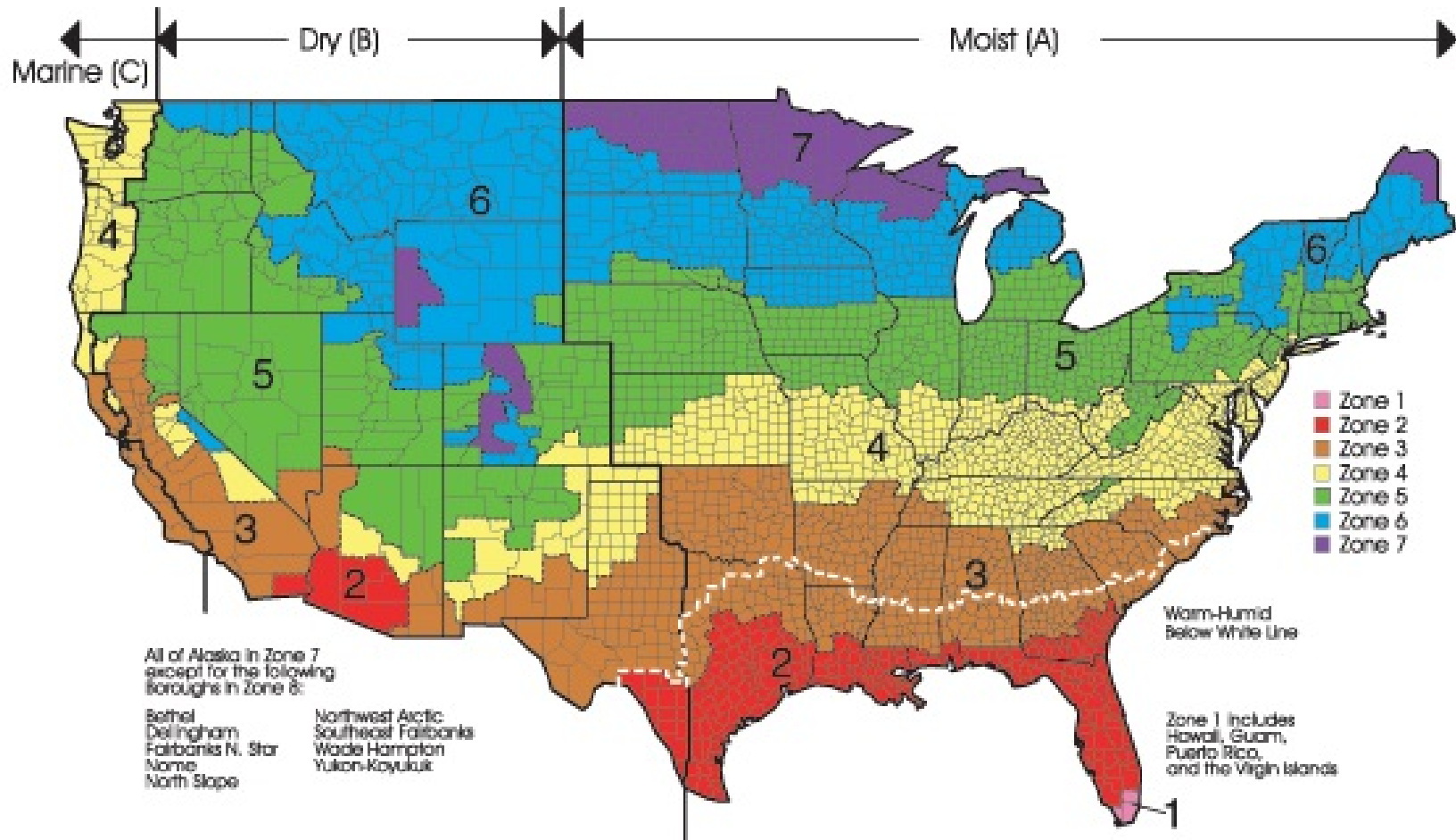
12 PIECES REQUIRED



7. Equipment and system controls
8. Fan Motor horsepower and controls
9. Duct sealing, duct and pipe insulation and location
10. Lighting fixture schedule with wattage and control narrative
11. Location of daylight zones on floor plan
12. Air sealing details

CLIMATE ZONE MAP

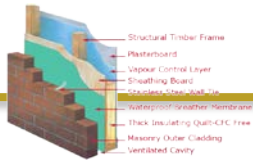
CODE OVERVIEW



Bexar, Travis, Comal and Guadalupe Counties are Zone 2A

MINIMUM ENVELOPE REQUIREMENTS

ARCHITECTURAL



	2009	2012	2015
Walls R-Value	R-13	R-13 + R-5 ci	R-13 + R-5 ci
Roofs R-Value	R-20.8	R-20.8	R-25 ci
Glazing – SHGC	0.25	0.25	0.25-SEW & 0.33-N
Glazing – U-Value	0.75	0.65	Fixed – 0.5, Operable – 0.65

- Wall (Metal Framed): ~28% increase!
- Roof (Insulation Entirely Above Deck): ~17% increase!
- Window (Projection Factor < 0.2)



MAXIMUM FENESTRATION AREA AND SKYLIGHT AREA C402.4.1

ARCHITECTURAL

2009

- Fenestration max was 40%
- Skylight area max was 3%

2012

- Fenestration max was 30%
- Skylight area max was 3%

2015

- Maximum is 30% gross wall area unless you meet certain requirements for daylight controls – then you may get to 40%.
- Skylight area is 3% max except could go up to 5% with daylight controls.

SKYLIGHTS NOW REQUIRED IN CERTAIN SITUATIONS, C402.4.2

ARCHITECTURAL

2009: None

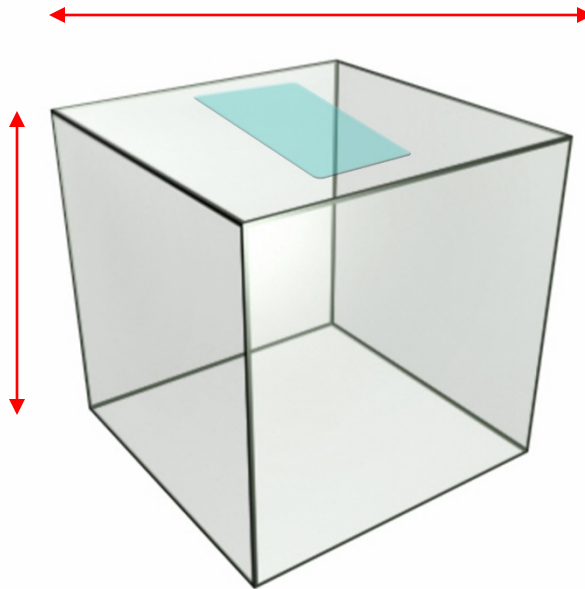
2012: Enclosed spaces >10,000 SF
directly under a roof

2015: Enclosed spaces >2,500 SF
directly under a roof

2009: None

2012: ceiling area
height > 15 feet

2015: 75% or more of
ceiling area height >
15 feet



SKYLIGHT REQUIRED FOR THESE TYPES OF SPACES:

- Office
- Lobby
- Atrium
- Concourse
- Corridor
- Storage
- Gym/Exercise
- Convention center
- Auto service
- Manufacturing
- Nonrefrigerated Warehouse
- Retail
- Distribution
- Transportation depot
- Workshop



AIR COOLED CHILLERS

MECHANICAL

2009

- < 150 tons:
9.562 EER
12.5 IPLV
- ≥ 150 tons:
9.562 EER
12.75 IPLV

2012

- < 150 tons:
9.562 EER
12.5 IPLV
- ≥ 150 tons:
9.562 EER
12.75 IPLV

2015

- < 150 tons:
10.1 EER
13.7 IPLV
- ≥ 150 tons:
10.1 EER
14.0 IPLV

- EER ~ 5% increase from IECC 2009
- IPLV ~ 9% increase from IECC 2009



AIR COOLED PACKAGED RTU'S

MECHANICAL

2009

- ≥ 5.5 tons < 11.25 tons: 10.1 EER
- ≥ 11.25 tons < 20 tons: 9.3 EER

(assuming gas heat)

2012

- ≥ 5.5 tons < 11.25 tons: 10.8 EER
- ≥ 11.25 tons < 20 tons: 10.4 EER

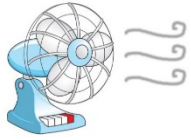
(assuming gas heat)

2015

- ≥ 5.5 tons < 11.25 tons: 11.0 EER
- ≥ 11.25 tons < 20 tons: 10.8 EER

(assuming gas heat)

- 5.5-11.25 ton EER ~ 8% increase from IECC 2009
- 11.25-20 ton EER ~ 14% increase from IECC 2009



MECHANICAL

2009

- (none)

2012

- Each cooling system that has a fan shall include either an air or water economizer except under certain exceptions.
- 2.75 tons and larger

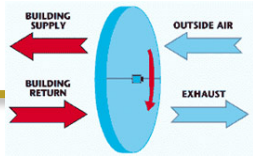
2015

- Each cooling system that has a fan shall include either an air or water economizer except under certain exceptions.
- 4.5 tons and larger

- This was new in 2012, but new to San Antonio and many Texas cities and entities in 2015.

ENERGY RECOVERY

MECHANICAL



2009
(none)

2012 / 2015

CLIMATE ZONE	PERCENT (%) OUTDOOR AIR AT FULL DESIGN AIRFLOW RATE							
	≥ 10% and < 20%	≥ 20% and < 30%	≥ 30% and < 40%	≥ 40% and < 50%	≥ 50 and < 60%	≥ 60% and < 70%	≥ 70% and < 80%	≥ 80 %
	DESIGN SUPPLY FAN AIRFLOW RATE (cfm)							
1A, 2A, 3A, 4A, 5A, 6A	≥ 26,000	≥ 16,000	≥ 5,500	≥ 4,500	≥ 3,500	≥ 2,000	≥ 1,000	≥ 0

This section not applicable for 2012

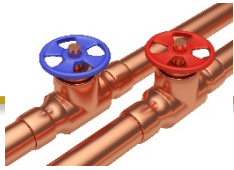


HYDRONIC BOILERS

MECHANICAL

2009	2012	2015	
(none)	(none)	BOILER SYSTEM DESIGN INPUT (BTU/H)	MINIMUM TURNDOWN RATIO
		≥ 1,000,000 and less than or equal to 5,000,000	3 to 1
		≥ 5,000,000 and less than or equal to 10,000,000	4 to 1
		>10,000,000	5 to 1

- Minimum Turndown is new to 2015



EFFICIENT WATER SUPPLY PIPING

MECHANICAL

2009	2012	2015
(none)	(none)	<ul style="list-style-type: none">Restrictions on max pipe lengths from mains (hot water)

- This is new to 2015
- ½” pipe run out to a faucet, 2 ft max from main.
- Pumps shut off when loop temp is satisfied.

LIGHTING POWER DENSITIES & CONTROLS



ELECTRICAL

2009

- Interior Lighting Power Allowance: 1.2 w/sf
- Exterior allowances remained the same.
- Auto-off control
- Light reduction controls

2012

- Interior Lighting Power Allowance: 1.2 w/sf
- Exterior allowances remained the same.
- Light reduction (manual)
- Auto-off control in all areas
- Occupancy sensors in specific locations

2015

- Interior Lighting Power Allowance: 0.87 w/sf
- Exterior allowances remained the same.
- Occupancy sensors throughout.
- Light reduction controls

- ~28% lighting power density reduction, 2009-2015.
- Lighting power density reduction based on school/university type.

2009

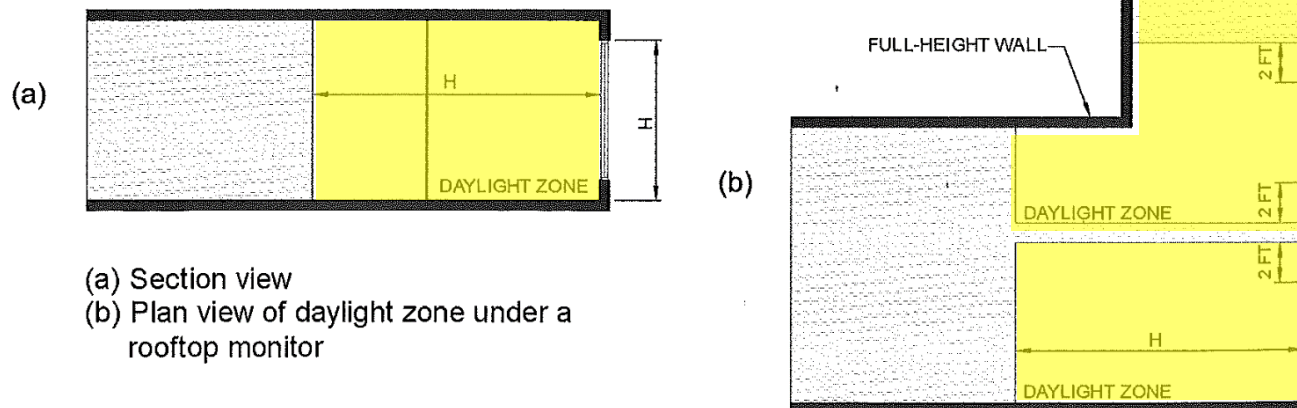
- (none)

2012

- Daylighting Zone is defined as 15' into room and width is window width plus 2' on each side

2015

- When?
 - Window installed in space.
 - Any space with more than 150 watts of lighting within daylight zones.
- Separate control for lights in daylight zone.
- Must be continuously dimmed to 15% within offices, classrooms, labs, and library reading rooms.



(a) Section view
 (b) Plan view of daylight zone under a rooftop monitor

FIGURE C405.2.3.2(1)
 DAYLIGHT ZONE ADJACENT TO FENESTRATION IN A WALL



2009

- (none)

2012

- HVAC systems 40 tons (cooling) & 50 tons (heating) and larger & controls
- Lighting system commissioning
- HVAC Test and balance is mandatory.

2015

- Section C104 Final Inspection
 - Commissioning is part of final inspection
- Section C408 System Commissioning
 - Cx process is detailed to comply with industry standards
 - The registered design professional or approved agency shall provide evidence of commissioning
 - Commissioned Systems (C403, C404, C405)
 - Service water-heating systems, Swimming pool water-heating systems, Spa water-heating systems and controls
 - HVAC systems 40 tons (cooling) & 50 tons (heating) and larger & controls
 - Lighting system commissioning
 - HVAC Test and balance is mandatory.

- Proposed process aligns with ASHRAE standards

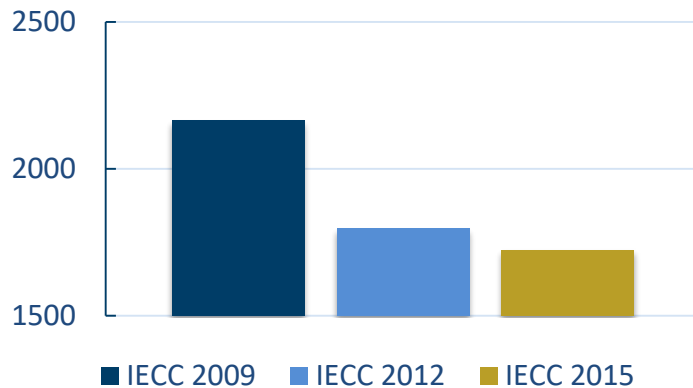
SO WHAT DOES THIS MEAN FOR YOU?

- CZ performed a study of a higher education building, the UT Dallas Alumni Center
- Direct comparison of IECC 2009 to 2012 to 2015

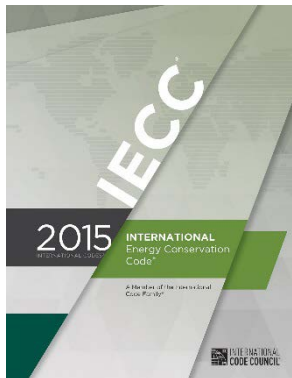
IECC 2009 VS. 2015 DIRECT COMPARISON

UT DALLAS ALUMNI CENTER

ANNUAL TOTAL ENERGY CONSUMPTION



CATEGORY	TOTAL ANNUAL ENERGY (MBTU)
IECC 2009	2,164
IECC 2012	1,796
IECC 2015	1,723



-Two IECC compliant buildings, using minimum efficiencies for each applicable energy code.

-IECC 2015 showed a 17% reduction in total energy consumption over IECC 2009.

- Architectural: **Be proactive with clients**, let them know that there are several new changes up front that could result in **additional costs**
- MEP updates to: **Air Cooled Chillers, Air Cooled Packaged RTU's, Lighting Power & Controls, Envelope Requirements**
- We found that the allowable energy consumption is decreased by nearly 17%, not really 30% as hoped.

THANK YOU!

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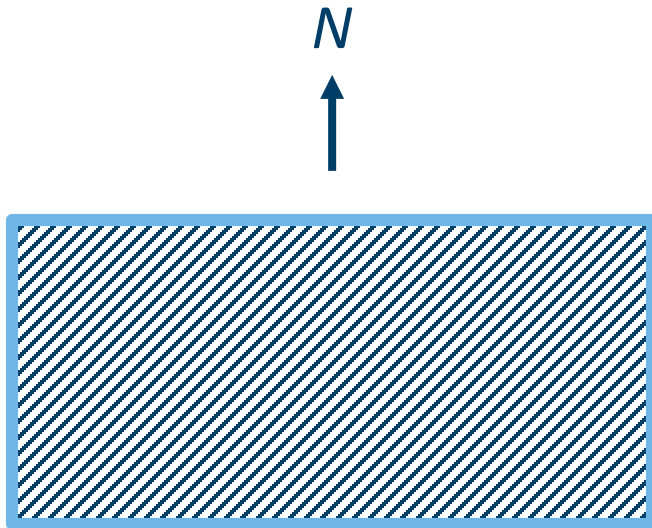
www.ClearyZimmermann.com



WINDOW GLAZING



TEST BUILDING PARAMETERS



- 2009 IECC Compliant
- 60,000 SF
- I-Shape
- 3 Story
- 30% Fenestration
- *Test Various Glazing Options...*

WINDOW GLAZING

