

ADVANCED ENERGY CODE

2010 FLORIDA BUILDING CODE-ENERGY CONSERVATION

COURSE CONTENT

PROVIDER# 0003374

FLORIDA AIR CONDITIONING APPRENTICESHIP ASSOCIATION

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COURSE #-

HOURS- 1

COURSE TITLE: ADVANCED ENERGY CODE “2010 FLORIDA BUILDING CODE- ENERGY CONSERVATION”

COURSE COMPILED BY PATRICK S. MESMER

INTRODUCTION- THERE WILL BE A POWER POINT PRESENTATION ALONG WITH NARRATION AND OPEN DISCUSSION. STUDENTS WILL BE ENCOURAGED TO TAKE NOTES.

#SLIDES 2, 3, AND 4

**BASE CODE AND THE BASICS**

One of the major changes to the energy code is the new volume of the code. The Commission has removed the energy provision from chapter 13 of the Building and Chapter 11 of the Residential Volumes and placed them in the new volume of the code; the Florida Building Code, Energy Conservation

Users will also have to learn a new format for the document, as it is now formatted based on the International Energy Conservation Code format.

There are a number of changes coming on the energy front. All duct sizing shall be in accordance with ACCA manual D. All newly constructed single family dwelling will be required to provide a certificate of duct testing. The testing must be accomplished in accordance with ASHRAE Standard 152. All ducts and air handlers shall be either located in conditioned space or tested by a Class 1 Building energy rating System (BERS) rater to be “substantially leak free”.

Replacement A/C units must be sized in accordance with a nationally recognized standard and calculation submitted for permitting.

Additionally, changes made to meet the legislative mandate of 2008 for an additional 5% increase in efficiency, there are other areas of change. As part of the code change process the Commission did approved a change to allow for energy calculations to be certified by any computer program that they approved. The commission will have to establish criteria for software approval but that should make the software pricing more competitive.

The major change to the energy code is the new volume of the code. The Commission has removed the energy provision from chapter 13 of the Building and Chapter 11 of the Residential Volumes and placed them in the new volume of the code; the Florida Building Code, Energy Conservation. The users will also have to learn a new format for the document, as it is now formatted based on the International Energy Conservation Code format.

Green: While there was an effort made to include the International Green Building Code in an Appendix of both the Building Volume and the Residential Volume of the code the proponents were not successful. The general feeling was this document is not ready for inclusion into the code.

#### 2009 International Energy Conservation Code (IECC)

Insulation

Building envelope

Fenestration (Windows)

Programmable Thermostats

Florida specifics are integrated into the document

The biggest change is reorganization of the code

The energy code is once again become a separate document: *The Florida Building Code, Energy Conservation*

The code is 5% more stringent than it is now

20% more stringent than the 2006 IECC

The base code is more prescriptive, so the “you gotta’s” likely make up the 5% increase in stringency

#### SLIDE#5- NEW CODE FORMAT

Chapter 1      ADMINISTRATION

Chapter 2      DEFINITIONS

Chapter 3      DESIGN CRITERIA (GENERAL)

Chapter 4 RESIDENTIAL ENERGY EFFICIENCY

Chapter 5 COMMERCIAL ENERGY EFFICIENCY

Chapter 6 REFERENCED STANDARDS

Appx A JURISDICTIONAL DATA

Appx B CRITERIA FOR COMPUTER MODELING

Appx C FORMS

SLIDE#6 - **RESIDENTIAL AND COMMERCIAL COMPLIANCE**

**RESIDENTIAL**

- 401 General
- 402 Building Thermal Envelope
- 403 Systems
- 404 Electrical Power and Lighting Systems
- 405 Simulated Performance Alternative

**COMMERCIAL**

- 501 General
- 502 Building Envelope Requirements
- 503 Bldg Mechanical Systems
- 504 Service Water Heating
- 505 Electrical Power and Lighting Systems
- 506 Total Building Performance

## SLIDE #7- COMPLIANCE METHODS-

### PRESCRIPTIVE AND PERFORMANCE

**401.2 Compliance.** Projects shall comply with Sections 401, 402.4, 402.5, and 403.1, 403.2.2, 403.2.3, and 403.3 through 403.9 (referred to as the mandatory provisions) and either:

1. Sections 402.1 through 402.3, 403.2.1 and 404.1 (prescriptive); or
2. Section 405 (performance).

The code still has two main compliance methods:

#### PRESCRIPTIVE METHOD:

Residential section 402 --Form 402

Residential will have an alternate Form 402 from a Florida-specific ResCheck

Commercial section 502—Form 502

No EZ Com will be available

Form 502 is only for shell buildings, renovations, changeouts

#### PERFORMANCE METHOD:

Form 405- Residential computer printout

Form 506- Commercial computer printout—

## SLIDE #8- COMPUTER PROGRAMS FOR CODE COMPLIANCE

**B-1.2 Calculation software tools.** Only compliance software tools approved by the Florida Building Commission shall be utilized to conform to the provisions of Section 405.

Computer programs allowed to be used for code compliance are no longer referenced by the code

Programs will be approved separately by the Florida Building Commission

They must utilize the Standard Reference Design (baselines) and other criteria from Normative Appendix B and demonstrate validity to the Commission.

They must print out in a format familiar to the building departments inspecting for code compliance

## SLIDE #9- LIMITED OR SPECIAL USE BUILDINGS

**101.4.10 Limited or special use buildings.** Buildings determined by the code official to have a limited energy use potential based on size, configuration or time occupied, or to have a special use requirement shall be considered limited or special use buildings and shall comply with the code by Form 502. Code compliance requirements may be adjusted by the code official to handle such cases when nationally recognized energy analysis procedures have been used to demonstrate that the building would use less energy than a code compliant building of the same configuration .|

## SLIDE #10- ALTERNATE METHODS FOR COMPLIANCE

**102.1 General.** This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been *approved* by the *code official* as meeting the intent of this code. Nationally recognized energy analysis procedures may be used to demonstrate that the building, or component thereof, will use less energy than a code compliant building (or building component) of the same configuration.

Buildings determined by the code official to have a limited energy use or special use requirement may have code requirements adjusted by the code official where nationally recognized energy analysis procedures are used to demonstrate that the building would use less energy than a code compliant building.

Code official may approve alternate materials & methods where a nationally recognized energy analysis procedure is used to demonstrate that a building or component will use less energy than a code compliant building or component.

Code no longer requires Commission approval.

SLIDE #11- **REPLACEMENT OF AIR CONDITIONING EQUIPMENT**

**01.4.7- Exception #2**

2. If the unit being replaced is itself a functional unit, such as a condenser, it does not constitute a repair. Outdoor and indoor units that are not designed to be operated together must meet the U.S. Department of Energy certification requirements contained in Section 403.6.2.1.1. Matched systems are required; this match may be verified by any one of the following means:
  - a. AHRI data.
  - b. accredited laboratory.
  - c. manufacturer's letter.
  - d. letter from registered P.E. State of Florida.

SLIDE#12- **LOAD SIZING CALCULATION FOR RESIDENTIAL REPLACEMENT (Supplement 8/07/2012)**

**101.4.7.1.2 Replacement equipment sizing (Mandatory).** An A/C contractor or licensed Florida PE shall submit a nationally recognized method based sizing calculation to the code official at the time of permit application for total replacement of the condensing and evaporator components of HVAC systems **for residential buildings** in accordance with Florida law and the provisions of Section 403.6.1 or Section 503.2.1. as applicable.

## **SLIDE#13- EQUIPMENT SELECTION**

### **403.6 Heating and cooling equipment (Mandatory).**

**403.6.1 Equipment sizing.** Heating and cooling equipment shall be sized in accordance with ACCA Manual S based on the equipment loads calculated in accordance with Manual J or other approved heating and cooling calculation methodologies, based on building loads for the directional orientation of the building. The manufacturer and model number of the outdoor and indoor units (if split system) shall be submitted along with the sensible and total cooling capacities at the design conditions described in Section 302.1. This Code does not allow designer safety factors, provisions for future expansion or other factors which affect equipment sizing. System sizing calculations shall not include loads created by local intermittent mechanical ventilation such as standard kitchen and bathroom exhaust systems.

**403.6.1.1 Cooling equipment capacity.** Cooling only equipment shall be selected so that its total capacity is not less than the calculated total load but not more than 1.15 times greater than the total load calculated according to the procedure selected in Section 403.6, or the closest available size provided by the manufacturer's product lines. The corresponding latent capacity of the equipment shall not be less than the calculated latent load.

**SLIDE# 14 and #15- DUCT TESTING AND SEALING REQUIREMENTS (Supp. 8/07/2012)**

**101.4.7.1.1 Duct sealing upon equipment replacement (Mandatory).** At the time of the total replacement of HVAC evaporators and condensing units **for residential buildings**, all accessible (a minimum of 30 inches clearance) joints and seams in the air distribution system shall be inspected and sealed where needed using reinforced mastic or code approved equivalent and shall include a signed certification by the contractor that is attached to the air handler unit stipulating that this work has been accomplished.

**Exceptions:**

1. Ducts in conditioned space.
2. Joints or seams that are already sealed with fabric and mastic.
3. If system is tested and repaired as necessary.



## **SLIDE #16- DUCT SIZING**

**403.2.5 Air distribution system sizing and design (Mandatory).** All air distribution systems shall be sized and designed in accordance with recognized engineering standards such as ACCA Manual D or other standards based on the following:

1. Calculation of the supply air for each room shall be based on the greater of the heating load or sensible cooling load for that room.
2. Duct size shall be determined by the supply air requirements of each room, the available static pressure, and the total equivalent length of the various duct runs.
3. Friction loss data shall correspond to the type of material used in duct construction

## **SLIDE # 17- FENESTRATION REQUIREMENTS (WINDOWS)**

**402.3.1 *U*-factor.** An area-weighted average of fenestration products shall be permitted to satisfy the *U*-factor requirements.

**402.3.2 Glazed fenestration SHGC.** An area-weighted average of fenestration products more than 50 percent glazed shall be permitted to satisfy the SHGC requirements.

**402.3.3 Glazed fenestration exemption.** Up to 15 square feet (1.4 m<sup>2</sup>) of glazed fenestration per dwelling unit shall be permitted to be exempt from *U*-factor and SHGC requirements in Section 402.1.1. This exemption shall not apply to the *U*-factor alternative approach in Section 402.1.1.2 and the Total UA alternative in Section 402.1.1.3.

**402.3.4 Opaque door exemption.** One side-hinged opaque door assembly up to 24 square feet (2.22 m<sup>2</sup>) in area is exempted from the *U*-factor requirement in Section 402.1.1. This exemption shall not apply to the *U*-factor alternative approach in Section 402.1.1.2 and the total UA alternative in Section 402.1.1.3.

## **SLIDE#18- CLIMATE ZONES**

**301.1 General.** Climate *zones* shown in Table 301.1 constitute the zones recognized for Florida by the *International Energy Conservation Code*. Prescriptive envelope compliance methods in this code, Section 402 (residential) and Section 502 (commercial) have no difference in compliance criteria by climate zone. Climate criteria for the performance-based code compliance methods, Section 405 (residential) and Section 506 (commercial), are determined by climate data from the weather data collection station nearest to the building's location.

**Figure 301.1 Climate Zones.** Reserved.

**301.2 Warm humid counties.** All Florida counties are considered warm humid counties.

There used to be three climate zones in Fla- there are now 2 (Prescriptive)

Climate zone #1- Dade, Broward, Monroe and Glades

Climate Zone #2- All other Counties

AND VISUAL INSPECTION OPTION

**402.4.2.1 Testing option.** Building envelope tightness and insulation installation shall be considered acceptable when tested air leakage is less than seven air changes per hour (ACH) when tested with a blower door at a pressure of 50 pascals (1 psf). Testing shall occur after rough in and after installation of penetrations of the building envelope, including penetrations for utilities, plumbing, electrical, ventilation and combustion appliances.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed;
2. Dampers shall be closed, but not sealed, including exhaust, intake, makeup air, backdraft and flue dampers;
3. Interior doors shall be open;
4. Exterior openings for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
5. Heating and cooling system(s) shall be turned off;
6. HVAC ducts shall not be sealed; and
7. Supply and return registers shall not be sealed.

**402.4.2.2 Visual inspection option.** Building envelope tightness and insulation installation shall be considered acceptable when the items listed in Table 402.4.2, applicable to the method of construction, are field verified. Where required by the *code official*, an *approved party* independent from the installer of the insulation shall inspect the air barrier and insulation.

SLIDE# 21- NOT IN THE ENERGY CODE, BUT IMPORTANT TO HVAC CONTRACTORS  
403.2.4- SECTION #4

**NOTICE TO HOMEOWNER**

A PART OF YOUR AIR-CONDITIONING SYSTEM, THE AIR HANDLER, IS LOCATED IN THE ATTIC. FOR PROPER, EFFICIENT, AND ECONOMIC OPERATION OF THE AIR-CONDITIONING SYSTEM, YOU MUST ENSURE THAT REGULAR MAINTENANCE IS PERFORMED.

YOUR AIR-CONDITIONING SYSTEM IS EQUIPPED WITH ONE OR BOTH OF THE FOLLOWING: (1) A DEVICE THAT WILL ALERT YOU WHEN THE CONDENSATION DRAIN IS NOT WORKING PROPERLY OR (2) A DEVICE THAT WILL SHUT THE SYSTEM DOWN WHEN THE CONDENSATION DRAIN IS NOT WORKING. TO LIMIT POTENTIAL DAMAGE TO YOUR HOME, AND TO AVOID DISRUPTION OF SERVICE, IT IS RECOMMENDED THAT YOU ENSURE PROPER WORKING ORDER OF THESE DEVICES BEFORE EACH SEASON OF PEAK OPERATION.

SLIDE# 22- THERMOSTATS

**403.1.1 Programmable thermostat.** Where the primary heating system is a forced-air furnace, at least one thermostat per dwelling unit shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day. This thermostat shall include the capability to set back or temporarily operate the system to maintain zone temperatures down to 55°F (13°C) or up to 85°F (29°C). The thermostat shall initially be programmed with a heating temperature set point no higher than 70°F (21°C) and a cooling temperature set point no lower than 78°F (26°C).

SLIDE#23- LOCKING REFRIGERATION ACCESS CAPS

- **1101.10-** Refrigeration (General)
- Locking Caps required for access fittings

SLIDE #24- Duct Tightness

- **403.2.2.1**- Duct tightness:
    - Prescriptive compliance: Must be inside conditioned space or tested by BERS Rater to ASHRAE Standard 152
- BERS- (Building Energy Rating System)

SLIDE# 25- POST CONSTRUCTION DUCT TEST

- **403.2.2.1**- SECTION #1- Leakage to outside cannot exceed 3 cfm per 100 sq. ft. of conditioned floor area
- OR
- 9 cfm per 100 sq. ft. of conditioned floor area when tested at a diff of .1 IWC across entire system including AHU
  - All vents sealed during test

SLIDE #26- ROUGH IN TEST

- **403.2.2.1 SECTION #2**

Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 ft<sup>2</sup> (9.29 m<sup>2</sup>) of *conditioned floor area* when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the roughed-in system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 2 cfm (56.3 L/min) per 100 ft<sup>2</sup> (9.29 m<sup>2</sup>) of *conditioned floor area*.

SLIDE #27- COMMERCIAL AND RESIDENTIAL DUCT MATERIALS

- **Table 503.2.7.2**
- Florida-specific duct construction requirements are combined into a table,
  - New criteria added for plastic duct, duct fasteners
  - Duct support criteria moved to the Mechanical code

SLIDE #28- MINIMUM INSULATION FOR DUCTS

**405.2 Mandatory requirements.** Compliance with this section requires that the mandatory provisions identified in Section 401.2 be met. All supply and return ducts not completely inside the *building thermal envelope* shall be insulated to a minimum of R-6.

SLIDE #29- DUCT SEALING REQUIREMENTS

**403.2.2 Sealing (Mandatory).** All ducts, air handlers, filter boxes and building cavities which form the primary air containment passageways for air distribution systems shall be considered ducts or plenum chambers, shall be constructed and sealed in accordance with 503.2.7.2 of this code and shall be shown to meet duct tightness criteria in Section 403.2.2.1.

SLIDE #30- DUCT CONSTRUCTION REQUIREMENTS-

**503.2.7.2 Duct construction.** All ducts, air handlers, filter boxes, building cavities, mechanical closets and enclosed support platforms that form the primary air containment passageways for air distribution systems shall be considered ducts or plenum chambers and shall be constructed and erected in accordance with Table 503.2.7.2 and with Chapter 6 of the *Florida Building*

## SLIDE #31- DUCT R VALUE TABLE

**TABLE 503.2.7.1  
MINIMUM DUCT INSULATION R-VALUES,  
HEATING AND COOLING SUPPLY AND RETURN DUCTS**

Location	Supply Duct	Return Duct
Exterior of building	R-6	R-4.2
Ventilated Attic	R-6	R-4.2
Unvented attic above insulated ceiling	R-6	R-4.2
Unvented attic with roof insulation	R-4.2	None
Unconditioned spaces <sup>a</sup>	R-4.2	R-4.2
Indirectly conditioned spaces <sup>b</sup>	None	None
Conditioned spaces	None	None
Buried	R-4.2	None

a. Includes crawl spaces, both ventilated and non-ventilated.

b. Includes return air plenums with or without exposed roofs above.

## SLIDE #32- BUILDING THERMAL ENVELOPE

**BUILDING THERMAL ENVELOPE.** The basement walls, exterior walls, floor, roof, and any other building element that enclose *conditioned space*. [This boundary also includes the boundary between *conditioned space* and any exempt or unconditioned space. See “Adjacent wall, ceiling or floor.”]

## SLIDE #33- COMMERCIAL ENERGY EFFICIENCY

**501.1 Scope.** The requirements contained in this chapter are applicable to *commercial buildings*, or portions of commercial buildings and to multiple-family residential buildings greater than 3 stories.

## SLIDE #34 and 35- VENTILATION

**503.2.5 Ventilation.** Ventilation, either natural or mechanical, shall be provided in accordance with Chapter 4 of the *Florida Building Code, Mechanical*. Where mechanical ventilation is provided, the system shall provide the capability to reduce the outdoor air supply to the minimum required by Chapter 4 of the *Florida Building Code, Mechanical*.

**503.2.5.1 Demand controlled ventilation.** Demand control ventilation (DCV) is required for spaces larger than 500 ft<sup>2</sup> (50 m<sup>2</sup>) and with an average occupant load of 40 people per 1000 ft<sup>2</sup> (93 m<sup>2</sup>) of floor area (as established in Table 403.3 of the *Florida Building Code, Mechanical*) and served by systems with one or more of the following:

1. An air-side economizer;
2. Automatic modulating control of the outdoor air damper; or
3. A design outdoor airflow greater than 3,000 cfm (1400 L/s).

## SLIDE #36- EXHAUST AIR ENERGY RECOVERY

- **503.2.6-** Systems greater than 5000 CFM with 70% or more outside air must incorporate an energy recovery device under some circumstances.
- Exception- Where energy recovery systems are prohibited by *The Florida Bldg. Code- Mechanical*

## SLIDE # 37- ALLOWABLE FAN FLOOR HP

- 503.2.10.1
- Fan power limitation for supply fans, return/relief fans and fan-powered terminal units associated with systems providing heating or cooling capability, now has two options:
  - Allowable fan system motor nameplate hp
  - Fan system bhp

## SLIDE #38-New Water Chilling Package Table

- **TABLE 503.2.3 SECTION #7-** Provides 2 paths for determining compliance, A & B, and a new equation for determining chiller efficiency required (for max. full load and NPLV) where not designed for operation at AHRI 550/590 test conditions



SLIDE #39- LIGHTING

- **505.1-** Must have 50% high efficacy lamps

Compact fluorescent lamps, T-8 or smaller diameter linear

fluorescent lamps, or lamps with a minimum efficacy of:

1. 60 lumens per watt for lamps over 40 watts,
2. 50 lumens per watt for lamps over 15 watts to 40 watts, and
3. 40 lumens per watt for lamps 15 watts or less

SLIDE#40- DIFFERENT LIGHTING TYPES

**Examples:**

- Compact Fluorescent
- Linear Fluorescent
- Metal Halide
- High Pressure Sodium
- LED
- Induction

SLIDE #41- DAYLIGHTING CONTROLS

- **505.2.3-** Daylight Zone Control. Daylight zones, as defined by this code, shall be provided with individual controls that control the lights independent of general area lighting.

SLIDE #42- The End