Florida Building Code
Energy Conservation &
Florida Building Code Mechanical

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Overview

- **Part 1 – Florida Energy Conservation Code**
  - Residential
  - Commercial
- **Part 2 – ICC IMC Significant Changes**
- **Part 3 – Florida IMC Changes**
- **Part 4 – Sixth Edition Process**
Part 1
General

* Fewer Florida specifics are integrated into the document. IECC are us.
* The base document is the 2012 *International Energy Conservation Code* (IECC)
  * Although one document, the low rise residential and commercial/high rise residential provisions are separated into two sub-documents; Lots of duplication in definitions, standards, appendices
  * Sections have the same numbers—but with a “C” or an “R” in front of them. Expect confusion.
Residential
In general, there are two ways to comply with the energy code:

- A **Prescriptive** compliance method, where you do everything on a list of prescribed requirements (the residential “short form”); or

- A **Performance** compliance method (by computer program), where the building complies as a whole by means of an energy simulation analysis tool where the performance of the building as designed is compared to its performance when calculated with Standard Reference Design features. Effectively, the building must come in under an energy budget.


  * There are few minimum code requirements in a performance-based code.
Standards are set for the following building systems and components where new products are installed or replaced in existing buildings:

- Heating, ventilating or air conditioning
- Service water or pool heating system
- Lighting systems
- Replacement Fenestration
* Shall indicate but not be limited to: insulation materials and R-values, fenestration U-factors and SHGC etc.
How is the impact of climate variation handled in the code?

* The IECC divides Florida into two climate zones: Miami-Dade, Monroe and Broward Counties (Climate Zone 1) and the rest of the state (Climate Zone 2).

* Florida has expanded Climate Zone 1 to include Collier, Hendry, Lee and Palm Beach Counties.

* Florida’s performance-based code uses weather data for the closest weather station to the building to model impact of climate on the building.
* Just meet the values on Table R402.1.1 and all other prescriptive criteria and the building will pass code.

* R-values are minimums; U-factors are maximums

* Mass wall R-values: ex: 3/4 = R-3 if insulation is on exterior of the wall, R-4 if insulation is on the inside

* Impact rated fenestration complying with §R301.2.1.2 of the FBC-Residential, the maximum U-factor shall be 0.75 in Climate Zone 1 and 0.65 in Climate Zone 2.

### Table R402.1.1

<table>
<thead>
<tr>
<th>Cli Zn</th>
<th>Fenestra U-factor</th>
<th>Skylight U-factor</th>
<th>Fenes SHGC</th>
<th>Ceiling R-value</th>
<th>Wood Wall R-value</th>
<th>Mass Wall R-value</th>
<th>Floor R-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.65</td>
<td>0.75</td>
<td>0.25</td>
<td>30</td>
<td>13</td>
<td>3/4</td>
<td>13</td>
</tr>
<tr>
<td>2</td>
<td>0.40</td>
<td>0.65</td>
<td>0.25</td>
<td>38</td>
<td>13</td>
<td>4/6</td>
<td>13</td>
</tr>
</tbody>
</table>
**Compliance by the Building Thermal Envelope Method, UA Alternative (§R402.1.4)**

Table R402.1.3: Equivalent U-Factors

<table>
<thead>
<tr>
<th>Climate Zone (Cli Zn)</th>
<th>Fenestra U-factor</th>
<th>Skylight U-factor</th>
<th>Ceiling U-factor</th>
<th>Wood Wall U-factor</th>
<th>Mass Wall U-factor</th>
<th>Floor U-factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.50</td>
<td>0.75</td>
<td>0.035</td>
<td>0.082</td>
<td>0.197</td>
<td>0.064</td>
</tr>
<tr>
<td>2</td>
<td>0.40</td>
<td>0.65</td>
<td>0.030</td>
<td>0.082</td>
<td>0.165</td>
<td>0.064</td>
</tr>
</tbody>
</table>

- Mass wall U-factors: when more than half of the insulation is on interior of the wall:
  - Climate Zone 1 Maximum U-factor is U-0.17
  - Climate Zone 2 Maximum U-factor is U-0.14
  - Basement U-factor is 0.360 for warm-humid climates
Total UA Alternative (§R402.1.1.3)

- This is a **Prescriptive** code compliance alternative for residential applications, although it is typically done with a computer program called REScheck.
- It allows **U-value tradeoffs** for the building walls, windows, ceiling and floor.
- It is a mathematical equation, not an energy simulation; it calculates a U-factor average for the building as proposed and compares it to a U-factor average for the building with factors from **Table R402.1.3**.
- There is no limitation on percent of glazing
- All prescriptive requirements must still be met, including a maximum fenestration U-factor of 0.25.
Residential air leakage (Mandatory) (§R402.4.3)

* Windows & door infiltration limited to 0.3 cfm/ft²
Other prescriptive residential criteria:

* All sunrooms enclosing conditioned space shall meet the fenestration requirements of this code. (§R402.3.5)

* Where some or all of an existing fenestration unit is replaced with a new fenestration product, including sash and glazing, the replacement fenestration unit shall meet the applicable requirements for U-factor and SHGC in Table R402.1.1 (§R402.3.6)
Comparison of compliance by Section R402 and Section R405

Form R402: Prescriptive compliance

- **Walls, ceilings, floors:** Meet minimum R-values given in Table 402.1.1
  - CZ1  CZ2
  - **Frame walls:** R-13  R-13
  - **Block walls:**
    - Interior insulation: R-4  R-6
    - Exterior insulation: R-3  R-4
- **Ceilings:** R-30  R-38
- **Floors:**
  - Raised: R-13  R-13
  - SOG: R-0  R-0
- **Windows:**
  - U-factor: \( \leq 0.75 \) 0.65
  - SHGC: \( \leq 0.25 \) 0.25
- **Ducts:** R=8 if in attic. Must be tested to \( Q_n \) \( \leq 0.03 \) by an Energy Rater certified under 553.99 F.S. or other authorized by Florida law (Class A, B or Mechanical contractor)
- **HVAC Controls:** Programmable thermostat required for forced air furnaces

Form R405: Performance compliance

- **Walls, ceilings, floors:** No minimums except R-19 ceiling, space permitting (State law)
- **Windows:** No limit. Maximum weighted average SHGC 0.50 except if 4’ overhang
- **Ducts:** R-8 if in the attic. Credit provided if testing shows less leakage
- **HVAC Controls:** Thermostat required for each system. Credit for programmable thermostat.
Commercial
Commercial Code Compliance: There are 5 ways to meet code!

* **Building Envelope Requirements method (Table C402.1.2).** List of U-values that may not be exceeded PLUS extra equipment, lighting or “green” requirements to make it more stringent

* **Total Building Performance method (Section C407),** where TOTAL (envelope, equipment, lighting) potential energy use will be compared to “Standard Reference Design”
  * Computer programs must be certified to the Florida Building Commission as meeting the Florida code

* **ASHRAE 90.1-2010,** with 3 compliance methods:
  * Prescriptive Building Envelope Option
  * Building Envelope Tradeoff Option
  * Energy Code Budget Method (Chapter 11)
5th Edition FBCEC Commercial Compliance

Options That Came From the 2012 IECC

1. 90.1-2010

2. **2012 IECC**
   - C402 - Envelope
   - C403 - Mechanical
   - C404 - SWH
   - C405 - Lighting
   - AND
   - Pick One:
     - C406.2 – Eff. HVAC Performance
     - OR
     - C406.3 – Eff. Lighting Systems
     - OR
     - C406.4 – On-site Renewable Energy

3. **2012 IECC**
   - C407 – Total Building Performance
   - C402.4 – Air Leakage
   - C403.2 – Provisions applicable to all mechanical systems
   - C404 - SWH
   - Lighting Mandatory Sections
     - C405.2
     - C405.3
     - C405.4
     - C405.6
     - C405.7
   - Building energy cost to be ≤ 85% of standard reference design building
## Building Envelope Requirements, Fenestration: Table § C402.3

<table>
<thead>
<tr>
<th>Section</th>
<th>Climate Zone 1</th>
<th>Climate Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical fenestration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U-factor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed fenestration</td>
<td>0.50</td>
<td>0.50</td>
</tr>
<tr>
<td>Operable fenestration</td>
<td>0.65</td>
<td>0.65</td>
</tr>
<tr>
<td>Entrance doors</td>
<td>1.10</td>
<td>0.83</td>
</tr>
<tr>
<td>SHGC</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>Skylights</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U-factor</td>
<td>0.75</td>
<td>0.65</td>
</tr>
<tr>
<td>SHGC</td>
<td>0.35</td>
<td>0.35</td>
</tr>
</tbody>
</table>
Percentage of Vertical Fenestration Area to Gross Wall Area

- Allowed up to 30% maximum of above grade wall.
- Up to 40% maximum of above grade wall with daylighting controls.
Skylight Minimum Fenestration Area C402.3.1 & C402.3.1.2

- Limited to $\leq$ 3% of Roof Area
- Up to 5% allowed if automatic daylighting controls installed in daylight zones under skylights
Increased Vertical Fenestration with Daylighting Controls C402.3.1.1

- Up to 40% vertical fenestration area allowed, provided
  - No less than 50% of the conditioned floor area is within a daylight zone
  - Automatic daylighting controls are installed in daylight zones; and
  - VT of vertical fenestration is $\geq 1.1$ times SHGC

- **Exception:**
  - Fenestration that is outside the scope of NFRC 200 isn’t required to comply with VT
Vertical fenestration entirely located not less than 6 ft above the finished floor is permitted a maximum SHGC of 0.40
Skylights above daylight zones with automated daylight controls are permitted a maximum SHGC of 0.60.
# Air Leakage of Fenestration

## Table C402.4.3

<table>
<thead>
<tr>
<th>Fenestration Assembly</th>
<th>cfm/ft²</th>
<th>Test Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows, sliding glass doors, and swinging doors</td>
<td>0.20</td>
<td>AAMA/WDMA/CSA 101/I.S.2/A440 or NFRC 400</td>
</tr>
<tr>
<td>Skylights - with condensation weepage openings</td>
<td>0.30</td>
<td></td>
</tr>
<tr>
<td>Skylights – all other</td>
<td>0.20</td>
<td></td>
</tr>
<tr>
<td>Curtain walls and storefront glazing</td>
<td>0.06</td>
<td>NFRC 400 or ASTM E283 at 1.57 psf</td>
</tr>
<tr>
<td>Commercial glazed swinging entrance doors</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Revolving doors</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Garage doors</td>
<td>0.4</td>
<td>ANSI/DASMA 105, NFRC 400, or ASTM E283 at 1.57 psf</td>
</tr>
<tr>
<td>Rolling doors</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

### Exceptions
- Field-fabricated fenestration assemblies
- Fenestration in buildings that meet the building test for air barrier compliance option
This is the standard that the Florida energy code has been based on for the past 35 years.

Engineers are familiar with it and have no problems with using it.

There are three compliance methods within ASHRAE 90.1:

- **Section 5.5**, the Prescriptive Building Envelope Option. Limitation: vertical fenestration \( \leq 40\% \) of gross wall area and skylights \( \leq 5\% \) of gross roof area.

- **Section 5.6**, the Building Envelope Tradeoff Option.

- **Chapter 11**, the Energy Cost Budget Method.
Energy Codes – ASHRAE 90.1

- **Standard 90.1 Basics**
- New versions released every 3 years
- Current version is 2010
  - Requirements for lighting control are significantly more stringent than in 90.1-2007 and even IECC 2012
- **US Dept. of Energy issued ruling** that by Oct. 2013 all state must certify they meet or exceed ASHRAE 90.1 - 2010
Resources

* National resources: www.energycodes.gov/
* Building Officials Association of Florida: www.boaf.org
* DBPR staff support: (850) 487-1824
The Florida Building Commission, which meets every two months, is responsible for all actions taken relative to the *Florida Building Code*.

There are eleven Technical Advisory Committees, which meet when the Commission identifies issues in need of technical review and recommended actions. The Energy Technical Advisory Committee (TAC) meets as needed, typically via teleconferenced phone call.

To stay informed, register with the Building Code Information System [www.floridabuilding.org](http://www.floridabuilding.org). You will receive mass emails on issues that come before the Florida Building Commission.

*Code support is staffed by the Florida Department of Business and Professional Regulation (DBPR). Call them at (850) 487-1824 with questions about the Florida Building Code.*
Part 2

Can be purchased from ICC
* FBCM 102.3 Mandates maintenance per ASHRAE Std 180

* FBCM 202 Definition of Environmental air includes parking garage exhaust

* FBCM 306.5 Changed roof access above 16 ft. – no portable ladders, 24” top step to roof, 30” clearance in front of ladder

* FBCM 308.5 Labeled assemblies must comply with UL 1618
* FBCM 401.4 Changes to air inlet opening location requirements

* FBCM 403.3 Nail stations must provide source capture

* FBCM 404.1 Clarified automatic operating garage exhaust procedures

* FBCM 501.2 Clarified Independent Exhaust system requirements

* FBCM 505.1 & 506.4 Cannot combine toilet and domestic kitchen exhaust
∗ FBCM 506.3.7.1, 506.3.8 & 506.3.9 Added provisions for grease reservoirs in grease ducts and other minor changes

∗ FBCM 506.3.10 Added underground grease ducts

∗ FBCM 506.3.11.2 Cannot add field applied partial grease duct enclosure for sole purpose to reduce clearance to combustibles

∗ FBCM 507.2 Added exception for hood requirement for appliance with integral down-draft exhaust
* FBCM 507.2.1 Added exception for Type I exhaust for appliance tested in accordance with Section 17 of UL 710B

* FBCM 507.2.1.1 Changes to exhaust fan interlock on Type I hoods for gas appliances with pilot lights

* FBCM 507.2.1.2 Type I hoods are now required to have a flow rate label

* FBCM 507.2.2 Type II hoods have some minor changes
* FBCM 601.4 Chimneys and vents can now pass through a plenum under one of three new allowances

* FBCM 602.2.1 Materials in plenums now have new exceptions

* FBCM 603.7 Rigid duct penetrations have some minor changes

* FBCM 603.9 All duct tape must now be UL 181 listed

* FBCM 202 & 603.17 Fabric duct dispersal systems have been added
* FBCM 805.3 Factory built Chimney offsets has now been defined

* FBCM 901.4 Fireplace accessories are now required to be labeled to comply with UL 907

* FBCM 928 Evaporative cooling equipment section added

* FBCM 1101.10 Locking access port caps not required if otherwise secured

* FBCM 1105.6 & 1105.6.3 There are changes to mechanical room ventilation
Part 3
Florida Significant Changes
Can obtain online at Floridabuilding.org
BOILER, HOT WATER SUPPLY. Any vessel used for generating hot water to be used external to the vessel, which exceeds any of the following limitations:

1. A heat input capacity of 400,000 Btuh (117.2 kW).
2. A water temperature of 210ºF (99ºC).
3. A nominal water capacity of 120 gal (454 L).
**DESIGN FLOOD ELEVATION.** The elevation of the “design flood,” including wave height, relative to the datum specified on the community’s legally designated flood hazard map. In areas designated as Zone AO, the design flood elevation shall be the elevation of the highest existing grade of the building’s perimeter plus the depth number (in feet) specified on the flood hazard map. In areas designated as Zone AO where a depth number is not specified on the map, the depth number shall be taken as being equal to 2 feet (610 mm).
301.16.1 High-velocity wave action Coastal high hazard areas. In flood hazard areas subject to high-velocity wave action coastal high hazard areas, mechanical systems and equipment shall not be mounted on or penetrate walls intended to break away under flood loads.

307.2.5 Pipe insulation. All horizontal primary condensate drains within unconditioned areas shall be insulated to prevent condensation from forming on the exterior of the drain pipe.
Section 505.2, add Exception to read as follows:

Exception:

In a single-family dwelling, make-up air is not required for range hood exhaust systems capable of exhausting:

(a) Four hundred cubic feet per minute or less; or

(b) More than 400 cubic feet per minute but no more than 800 cubic feet per minute if there are no gravity vent appliances within the conditioned living space of the structure.

Section 515 on Mausoleum Relief Vent
SECTION 516

CARBON MONOXIDE CONTROL SYSTEMS

516.1 Carbon monoxide control systems. See Section 908.7 916 of the Florida Building Code, Building.
601.5 Balanced Return Air. Restricted return air occurs in buildings when returns are located in central zones and closed interior doors impede air flow to the return grill or when ceiling spaces are used as return plenums and fire walls restrict air movement from one portion of the return plenum to another. Provisions shall be made in both residential and commercial buildings to avoid unbalanced air flows and pressure differentials caused by restricted return air. Pressure differentials across closed doors where returns are centrally located shall be limited to 0.01 inch WC (2.5 pascals) or less. Pressure differentials across fire walls in ceiling space plenums shall be limited to 0.01 inch WC (2.5 pascals) by providing air duct pathways or air transfer pathways from the high pressure zone to the low zone.
Exceptions:

1. Transfer ducts may achieve this by increasing the return transfer $1\frac{1}{2}$ times the cross sectional area (square inches) of the supply duct entering the room or space it's serving and the door having at least an unrestricted 1 inch undercut to achieve proper return air balance.

2. Transfer grilles shall use 50 square inches (of grille area) to 100 cfm (of supply air) for sizing through-the-wall transfer grilles and using an unrestricted 1 inch undercutting of doors to achieve proper return air balance.

3. Habitable rooms only shall be required to meet these requirements for proper balanced return air excluding bathrooms, closets, storage rooms and laundry rooms, except that all supply air into the master suite shall be included.
603.1.1 Space provided. Sufficient space shall be provided adjacent to all mechanical components located in or forming a part of the air distribution system to assure adequate access for (1) construction and sealing in accordance with the requirements of Section 603.1 of this code; (2) inspection; and (3) cleaning and maintenance. A minimum of 4 inches (102 mm) is considered sufficient space around air handling units.

Exception: Retrofit or replacement units not part of a renovation are exempt from the minimum clearance requirement.
1001.1 Scope (Exceptions), add exception 8 as follows:

8. Boiler or pressure vessels subject to inspection as provided in the Florida Statutes 554-Boiler Safety Act, administered by the Boiler Safety Program, State Fire Marshal’s Office.

Section 1004, Boilers, Installation. Add a section to read as follows:

1004.2.1 Carbon monoxide testing. Boilers shall be tested to a maximum level of 50 PPM of carbon monoxide as per OSHA guidelines.
FBCM Chapter 15, Referenced Standards

FBCM Changed to make Florida-specific
Part 4

The process for adoption for the Sixth Edition of the Florida Building Code is starting.

Go to Floridabuilding.org
Click fifth button on left-Proposed Code Modifications
Click third button-Code Development & Hot Topics
Click top button-6th Edition (2017) FBC Code Development
Click last-Complete Revision History to the 2015 I Codes
Questions
Thank You !!!
sbassett@fleng.org