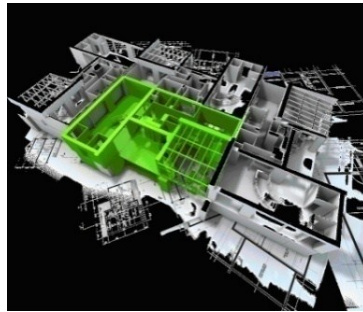
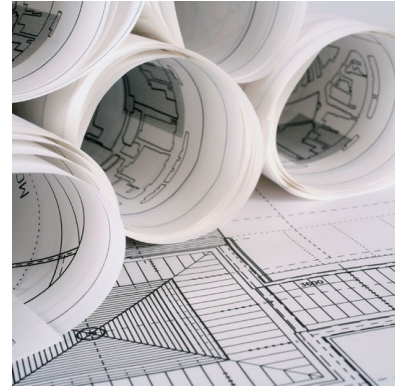


# Energy Simulation Tool Approval Technical Assistance Manual



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## Table of Contents

Introduction .....	5
1 Overview of Process.....	6
1.1 Special Terms and Definitions.....	6
1.2 Approval Guidelines .....	7
1.3 Optional Capabilities .....	8
2 Types of Approval .....	9
2.1 Full Approval & Re-Approval of Compliance Software Programs.....	9
2.2 Approval of New Features & Updates .....	10
2.3 Challenging Compliance Software Program Approval .....	11
3 Vendor Requirements.....	12
3.1 Vendor Certification Statement.....	12
3.2 Availability to Commission.....	12
3.3 User Support .....	12
3.4 Compliance Software Vendor Demonstration.....	12
3.5 Application Checklist.....	13
3.6 Where to Send Application .....	13
4 User’s Manual and Help System Requirements.....	14
4.1 Statement .....	16
5 Alternative Compliance Software Program Tests .....	17
6 Residential Energy Compliance Software Programs.....	18
6.1 General Requirements.....	18
6.1.1 Climate Data.....	18
6.1.2 Florida “Credit” options .....	19
6.1.2.1 Radiant Barrier and IRCC.....	19
6.1.2.2 Cool Roof Option.....	19
6.1.2.3 Unvented Attic Option .....	19
6.1.2.4 Cross Ventilation Option.....	19
6.1.2.5 Whole House Fan Option .....	20
6.1.2.6 Water Heat Recovery Credit .....	20
6.1.2.7 Dedicated Heat Pump Option .....	21
6.1.2.8 Solar Water Heating Option.....	21
6.1.3 Multiple Systems.....	23
6.1.3.1 Multiple Heating Systems .....	23
6.1.3.2 Multiple Cooling Systems.....	23

6.1.3.3 Multiple Water Heating Systems .....	23
6.2 Minimum Capabilities .....	25
6.3 Compliance Report.....	25
6.4 Residential Energy Performance Testing .....	27
6.4.1 Residential Accuracy Test Cases .....	27
6.4.2 Reference Test Cases .....	27
6.4.3 Testing Procedures.....	28
7.1 General Requirements .....	30
7.2 Performance Based Compliance .....	31
7.2.1 Calculation Procedure.....	31
7.2.2 Calculation Methods .....	32
7.2.3 Error Handling.....	32
7.2.4 Climate Data.....	32
7.2.5 Utility Rates.....	32
7.3 Managing User Input .....	33
7.3.1 Building Descriptor Inputs and Restrictions.....	33
7.3.2 User Interface.....	33
7.3.3 Compulsory Input Checks .....	34
7.3.4 Handling of Missing Inputs.....	34
7.3.5 Validity Checks .....	34
7.3.6 Handling Invalid Input .....	34
7.3.7 Consistency Checks .....	34
7.3.8 Handling Inconsistent Input .....	35
7.4 Documentation .....	35
7.4.1 Compliance Report.....	35
7.5 Commercial Verification Tests .....	37
APPENDIX A.....	40
Minimum Required Content and Format .....	40
RESIDENTIAL Form 405-2010, EPL Display Card, Energy Code-Required Form Printouts .....	44
APPENDIX B .....	45
Minimum Required Content and Format .....	45
COMMERCIAL and HIGH-RISE RESIDENTIAL -Form 506-2010 Printouts.....	49
APPENDIX C.....	50
Florida Energy Code Standard Reference Design Auto-Generation Tests.....	50

## **Introduction**

As part of the new 2010 *Florida Building Code, Energy Conservation*, the Florida Building Commission will be charged with the responsibility of approving energy simulation tools.

This Manual explains the guidelines for approval of energy simulation tools (also referred to as compliance software programs) used to demonstrate compliance with the 2010 *Florida Building Code, Energy Conservation—the “Energy Code”* for residential and nonresidential building designs. An “energy simulation tool” is defined by the Energy Code as an approved software program or calculation-based methodology that projects the annual energy use of a building. Compliance software programs are used to demonstrate compliance with the Energy Code by the performance approach for building design. The requirement for residential compliance by the Simulated Performance Alternative is specified in Section 405 and Normative Appendix B of the Energy Code. The commercial (and residential high-rise) requirements for compliance by Total Building Performance are specified in Section 506 and Normative Appendix B of the Energy Code. Compliance software programs are used in the performance approach to demonstrate compliance with the Energy Code for building designs. The Florida Building Commission (the Commission) develops and implements the Energy Code.

## 1 Overview of Process

The purpose of this Technical Assistance Manual (“this Manual”) is to outline the Florida Building Commission’s approval process for compliance software programs and to define the procedures, guidelines and assumptions against which compliance software programs should be evaluated. The performance compliance requirements and procedures apply to both residential and nonresidential buildings. An alternative compliance procedure to that described in this document is acceptable as long as such alternative is approved by the Commission and designed to preserve the integrity of the performance Energy Code compliance process.

The reference procedures and method described in this manual establish the basis of comparison for all Energy Code compliance software. The approval process as outlined in this manual ensures that a minimum level of energy conservation is achieved regardless of the compliance software used. This is accomplished by:

- a) having candidate compliance software pass a series of industry standard tests,
- b) identifying minimum input which may be used to generate the Standard Reference Design,
- c) defining standard reports output requirements, and
- d) compliance software vendor-certification to the requirements in this Manual and the Energy Code.

### 1.1 Special Terms and Definitions

There are a few other special terms that are used in this Manual. The Commission approves the use of energy simulation tools (compliance software programs) for Energy Code compliance. Commission approval means that the Commission accepts the applicant's certification that a compliance software program meets the requirements of the Energy Code and this Manual.

- "Compliance" means that a building design in an application for a building permit complies with the Florida Building Code and meets the requirements described for building design standards.
- "Compliance supplement" is an independent user's manual for the compliance software program.
- "Energy Code" means the 2010 *Florida Building Code, Energy Conservation*.
- "Energy simulation tool" is defined by the Florida Building Code to mean an approved software program or calculation-based methodology that projects the annual energy use of a building.

- “Proposed Design” means a description or computer representation of the proposed building used to estimate annual energy use for determining compliance based on total building performance or design energy cost.
- “Standard Reference Design” means a version of the Proposed Design that meets the minimum requirements of the Florida Building Code and is used to determine the maximum annual energy use requirement for compliance based on total building performance.
- “Vendor” is the proponent of a candidate compliance software program.

## 1.2 Approval Guidelines

For the vendor, the process of receiving approval of a compliance software program includes preparing an application, working with the Commission staff to answer questions from either Commission staff or the public, and providing any necessary additional information regarding the application. The application includes the four basic elements outlined below. The Commission staff evaluates the compliance software program based on the completeness of the application and its overall responsiveness to staff and public comment.

The basic requirements for approval include:

1) Minimum compliance capabilities:

Compliance software programs shall have all the required capabilities identified in the 2010 *Florida Building Code, Energy Conservation*. The requirement for residential compliance is specified in Section 405 and Normative Appendix B of the Energy Code. The nonresidential requirements are specified in Section 506 and Normative Appendix B of the Energy Code.

2) Accuracy of energy simulation tool:

The compliance software program shall demonstrate acceptable levels of accuracy by performing and passing the required certification tests discussed in Chapters 6 (residential) and 7 (commercial) of this Manual as modified by the Vendor to address Florida’s specific climate conditions.

The compliance software program vendor performs the certification tests in Chapters 6 or 7, respectively, for residential or commercial projects. The vendor conducts the specified tests, evaluates the results and certifies in writing that the compliance software program passes the tests. The Commission may perform spot checks and may require additional tests to verify

that the proposed compliance software program is appropriate for Energy Code compliance purposes.

When energy analysis techniques are compared, two potential sources of discrepancies could be 1) the differences in user interpretation when entering the building specifications, and 2) the differences in the compliance software program's algorithms (mathematical models) for estimating energy use. The approval tests minimize differences in interpretation by providing explicit detailed descriptions of the test buildings that must be analyzed.

3) User's Manual or help system:

The vendor shall develop a user's manual and/or help system that meets the specifications in Chapter 4 of this manual.

4) Program support and reporting forms:

The vendor shall provide ongoing user and enforcement agency support as described in Chapter 3 of this manual.

In addition to explicit and technical criteria, Commission approval may also depend upon the Commission's evaluation of:

- Enforceability in terms of reasonably simple, reliable, and rapid methods of verifying compliance and,
- application of energy conservation features modeled by the compliance software and,
- the inputs used to characterize those features by the compliance software users and,
- dependability of the installation and energy savings of features modeled by the compliance software program.

### 1.3 Optional Capabilities

Optional capabilities are a special class of capabilities and user inputs that are not required of all compliance software but may be included at the option of the vendor. Additional optional capabilities may be proposed by vendors. For both cases, the Commission reserves the right to disapprove the certification application for a specific optional capability if there is not compelling evidence presented in the public process showing that the optional capability is sufficiently accurate and suitable to be used for compliance with the Energy Code. In addition, energy conservation measures modeled by optional capabilities shall be capable of being verified by local enforcement agencies.

The Commission's purpose in approving additional optional capabilities is to accommodate new technologies which have only begun to penetrate the



market and new modeling algorithms. Optional capabilities which evaluate measures already in relatively common use shall have their standard design for the measure based on the common construction practice for that measure since common practice is the inherent basis of the for all measures not explicitly regulated. For example, the Commission has no interest in an optional capability that evaluates the energy impacts of dirt on windows unless a new technology produces substantial changes in this aspect of a building relative to buildings without this technology. The burden of proof that an optional capability should be approved lies with the vendor.

## **2 Types of Approval**

This Manual addresses two types of compliance software program approval: full program approval (including amendments to programs that require approval), and approval of new program features and updates.

If compliance software program vendors make a change to their programs as described below, the Commission shall again approve the program.

- Any compliance software program change that affects the energy use calculations for compliance,
- the modeling capabilities for compliance,
- the format and/or content of compliance forms, or
- Any other change which would affect a building's compliance with the Energy Code requires another approval.

Changes that do not affect compliance with the Energy Code such as program changes to the user interface may follow a simplified or streamlined procedure for approval of the changes. To comply with this simpler process, the compliance software program vendor shall certify to the Commission that the new program features do not affect the results of any calculations performed by the program, shall notify the Commission of all changes and shall provide the Commission with one updated copy of the program and user's manual. Examples of such changes include fixing logical errors in computer program code that do not affect the numerical results (bug fixes) and new interfaces.

### **2.1 Full Approval & Re-Approval of Compliance Software Programs**

The Commission requires program approval when a candidate compliance software program has never been previously approved by the Commission, when the compliance software vendor makes changes to the program algorithms, or when any other change occurs that in any way affects the compliance results. The Commission may also require that all currently approved compliance software programs be approved again whenever

substantial revisions are made to the Energy Code or to the Commission's approval process. The Commission may change the approval process and require that all compliance software programs be approved again for several reasons including:

- If the Energy Code undergoes a major revision that alters the basic compliance process, then compliance software would have to be updated and re-approved for the new process.
- If new analytic capabilities come into widespread use, then the Commission may declare them to be required compliance software capabilities, and may require all compliance software vendors to update their programs and submit them for re-approval.

When re-approval is necessary, the Commission will notify all compliance software vendors of the timetable for renewal.

A compliance software program must be re-approved for new optional modeling capabilities when the vendor adds those optional capabilities. The vendor shall provide a list of the new optional capabilities and demonstrate that those capabilities are documented in revised user documentation. This may not include computer runs previously submitted.

Re-approval shall be accompanied by a cover letter explaining the type of amendment(s) requested and copies of other documents as necessary. The timetable for re-approval of amendments is the same as for full program approval.

## **2.2 Approval of New Features & Updates**

Certain types of changes may be made to previously approved compliance software through a streamlined procedure; including implementing a computer program on a new machine and changing executable program code that does not affect the results.

Modifications to previously approved compliance software including new features and program updates are subject to the following procedure:

- The compliance software program vendor shall prepare an addendum to the compliance supplement or compliance software program user's manual, when new features or updates affect the outcome or energy conservation measure choices, describing the change to the compliance software. If the change is a new modeling capability, the addendum shall include instructions for using the new modeling capability for compliance.

- The compliance software program vendor shall notify the Commission by letter of the change that has been made to the compliance software program. The letter shall describe in detail the nature of the change and why it is being made. The notification letter shall be included in the revised Compliance Supplement or compliance software user’s manual.
- The compliance software program vendor shall provide the Commission with an updated copy of the compliance software program and include any new forms created by the compliance software (or modifications in the reports).
- The Commission may approve the change, request additional information, reject the change or require that the compliance software vendor make specific changes to either the Compliance Supplement addendum or the compliance software program itself.

With Commission approval, the vendor may issue new copies of the compliance software with the Compliance Supplement addendum and notify compliance software program users and building officials.

### **2.3 Challenging Compliance Software Program Approval**

Any challenge to software approval by the Florida Building Commission shall be in accordance with Chapter 120, *Florida Statutes*.

### **3 Vendor Requirements**

Commission approval of compliance software programs is intended to provide flexibility in complying with the Energy Code. However, in achieving this flexibility, the compliance software program shall not degrade or evade the intent of the Energy Code to achieve a particular level of energy conservation.

The vendor has the burden of proof to demonstrate the accuracy and reliability of the compliance software relative to the test methods and to demonstrate the conformance of the compliance software to the requirements of this manual and the Energy Code.

Each compliance software vendor shall meet all of the following requirements as part of the compliance software approval process and as part of an ongoing commitment to users of their particular program.

#### **3.1 Vendor Certification Statement**

The vendor shall follow the procedure described in this document to certify to the Commission that the compliance software meets the requirements of the Energy Code and the criteria in this document for:

- Accuracy and reliability when compared to the standard tests; and
- Ability to generate minimum required Standard Reference Design from user inputs; and
- Suitability in terms of the accurate calculation of the correct energy/cost budget, the printing of standardized forms, and
- The documentation on how the program demonstrates compliance.

#### **3.2 Availability to Commission**

All compliance software program vendors are required to submit at least one fully working program version of the compliance software to the Commission's staff, and shall provide the Commission's Energy Technical Advisory Committee and interest groups access to the software for review during the approval process.

#### **3.3 User Support**

Compliance software vendors shall offer support to their users with regard to the use of the compliance software for compliance purposes.

#### **3.4 Compliance Software Vendor Demonstration**

The Commission may request compliance software vendors to physically demonstrate their program's capabilities. One or more demonstrations may

be requested before approval is granted. The Commission may hold one or more workshops with public review and vendor participation to allow for public review of the vendor's application. Such workshops may identify problems or discrepancies that may necessitate revisions to the application.

### **3.5 Application Checklist**

The following items shall be included in an application package submitted to the Commission for compliance software approval:

#### **1. Compliance Software Vendor Certification Letter**

The Vendor shall submit a signed compliance software letter, certifying that the compliance software meets the requirements, including accuracy and reliability when used to demonstrate compliance with the Energy Code and the requirements of this Manual.

#### **2. Computer Runs**

The required formats for building information reports are electronic Portable Document File (PDF). Reports will be automatically generated by the software. Each page of the report will have a header with the software name, revision and date.

#### **3. Compliance Supplement and User's Manual**

The vendor shall submit a complete copy of their compliance software program's user manual, including material on the use of the compliance software for compliance purposes and an executable copy of the compliance software program for random verification of compliance analyses.

### **3.6 Where to Send Application**

Two copies of the full application package should be sent to:

Florida Building Commission  
Building Codes and Standards Office  
2555 Shumard Oak Blvd.  
Tallahassee, Florida 32399-2100

Following submittal of the application package, the Commission may request additional information. This additional information is often necessary due to complexity of compliance software. Failure to provide such information in a timely manner may be considered cause for rejection or disapproval of the application. A re-submission of a rejected or disapproved application will be considered a new application.

## **4 User’s Manual and Help System Requirements**

The compliance software program user’s manual and help system should be written in a clear and concise manner.

Each compliance software program vendor is required to publish a compliance supplement or an independent user's manual which explains how to use the compliance software for compliance with the Energy Code. The manual may also exist in electronic form, either on the user’s workstation or web enabled. The document should deal with compliance procedures and user inputs to the compliance software. Both the compliance software program user’s manual and help system should positively contribute to the user's ability and desire to comply with the Energy Code and to the enforcement agency's ease of verifying compliance. The compliance software program user’s manual and help system should minimize or reduce confusion and clarify compliance applications. The Commission may reject a compliance software program certification submittal whose compliance software program user’s manual and help system does not serve or meet these objectives.

The compliance software program user’s manual and help system should:

- Describe the specific procedures for using the compliance software for compliance with the Energy Code.
- Provide instructions for preparing the building input, using the correct inputs, and using each of the approved optional capabilities (or exceptional methods) for which the compliance software is approved.
- Explain how to generate the compliance reports and related compliance documentation. A sample of properly prepared compliance documentation shall be included as part of the manual or help system.

The compliance software program user’s manual and helps system serve two major purposes:

- It helps building permit applicants and others use the compliance software program correctly, and guide them in preparing complete compliance documentation to accompany building permit applications.
- It helps enforcement agency staff check permit applications for compliance with the Energy Code.

The compliance software program user's manual and help system serves as a crucial performance method reference in resolving questions concerning specific compliance software program attributes approved modeling capabilities and procedures in the context of both compliance and enforcement.

The compliance software program user's manual and help system should contain a chapter or section on how to model buildings for compliance and how to prepare a building input file for a compliance run. The following are examples of topics to include:

- What surfaces to model (exterior, interior floors, etc.);
- How to enter data about these surfaces;
- How to model exterior shading (fins, overhangs, etc.);
- Appropriate zoning for compliance modeling;
- Selection of correct occupancy types;
- How to model similar systems;
- How to model buildings or portions of a building with no heating or cooling;
- Requirements for written justification and additional documentation on the plans and in the specifications for exceptional items;
- Program modeling limitations.

All program capabilities should be described in sufficient detail to eliminate possible confusion as to their appropriate use. While references to the compliance software program's regular user's manual are acceptable, a complete listing of all inputs and/or commands necessary for compliance should be included in the compliance software program user's manual and help system.

The compliance software program user's manual and help system should contain clear and detailed information on how to use the compliance software to model buildings for compliance with the Energy Code.

The compliance software program user's manual and help system should include the following:

- Description of the value or values associated with each of input.
- Restrictions on each variable.
- Listing of the range beyond which inputs are unreasonable for any variable.
- Description of options for any user-defined variable.
- A chapter or section which covers each output report.

Appendices, as needed, to provide any additional background information that is not crucial in explaining the basic functioning of the program for compliance. For example:

- An appendix may contain variations of compliance forms as described above.
- An appendix may include a series of construction assembly forms to aid the compliance software program user.
- An appendix may reprint important sections of the manual that are crucial to modeling buildings correctly for compliance with the compliance software program.
- Although the organizational format is not fixed, all information contained in the compliance software program user's manual and help system should be easy to find through use of a table of contents, an index, or through a context sensitive help system.

#### 4.1 Statement

The following statement shall appear, in a box, within the first several pages of the compliance software program user's manual and help system

[Insert Name of Calculation Method] may be used to show compliance with 2010 *Florida Building Code, Energy Conservation* only when the following reference documents are readily available to the program user:

- 2010 *Florida Building Code, Energy Conservation*
- Energy Simulation Tool Approval: Technical Assistance Manual (TAM 2010-1.0)



## **5 Alternative Compliance Software Program Tests**

Sections 6.4 and 7.5 of this Manual identify a series of tests to verify that compliance software accurately demonstrate compliance. A compliance software program vendor may propose alternate tests when the vendor believes that one or more of the standard tests are not adequate for the compliance software program under consideration. The Commission will evaluate the alternate tests and will accept them if they are found to reflect acceptable engineering techniques.

If alternate tests are accepted by the Commission, the tests will be available for use by all compliance software programs. An alternate test will coexist with the standard test presented in this Manual until the Manual is revised. When a new version of this Manual is produced, the alternative test may be substituted for the current test or may continue to coexist with the original test.

## 6 Residential Energy Compliance Software Programs

### 6.1 General Requirements

As per Section 405.3 of the *Florida Building Code, Energy Conservation*, compliance based on simulated energy performance requires that a proposed residence (*Proposed Design*) be shown to have an annual normalized, modified energy load that is less than or equal to 80% of the annual energy load of the *Standard Reference Design* as specified in Normative Appendix B, Section B-1.1 to make the Energy Code 20 percent more stringent than the “2007” (Effective October 31, 2007) Florida’s Standard Reference Design (Baseline) features. The *Standard Reference Design* and *Proposed Design* utilized by the energy simulation tool shall be configured and analyzed as specified in Table B-1.1.2 of the *Florida Building Code, Energy Conservation*.

In accordance with Section 401.2 of the Energy Code, compliance software programs shall designate that the mandatory Energy Code provisions in Sections 401, 402.4, 402.5, and 403.1, 403.2.2, 403.2.3, and 403.3 through 403.9 shall also be met as well as any relevant performance criteria in Section 405.

The compliance software shall accept a specified range of inputs for the *Proposed Design*, and then use these inputs to describe the proposed building on the required output forms. The proposed building inputs are also used to create a *Standard Reference Design* building based on the *Proposed Design* building and the energy budget generation rules used to incorporate the prescriptive requirements into the *Proposed Design*.

#### 6.1.1 Climate Data

The compliance software program shall perform simulations using hourly values of climate data, such as temperature and humidity, derived from TMY3 (Typical Meteorological Year) climate data. The compliance software program shall calculate solar radiation on exterior surfaces on an hourly basis from the values of direct normal irradiance and diffuse horizontal irradiance contained in the climate data, taking ground reflectance into account.

Climate criteria for the performance-based building code compliance methods are determined by climate data from all Florida TMY3 weather data collection stations. Energy Code calculations shall use the data collection site for the nearest city with respect to the building’s location.

## **6.1.2 Florida “Credit” options**

### **6.1.2.1 Radiant Barrier and IRCC**

When the specified code criteria is met, apply the emissivity to the underside of the roof decking if software is capable of accurately modeling interior radiation; or if not apply an R value to the roof decking of 6.77 for a radiant barrier and 2.185 for an IRCC, based on a standard R value of 0.728 with no radiant coating.

### **6.1.2.2 Cool Roof Option**

When the specified code criteria for tested product is met, apply the roof reflectance provided to the roof surface. Otherwise the default roof reflectance (0.04, i.e., solar absorbance of 0.96) is to be used.

### **6.1.2.3 Unvented Attic Option**

Normally a vented attic joined to the conditioned space ceiling should be modeled. It has ventilation to the outside determined by a user entered (and reported) ventilation rate. The software should provide an option for a sealed (unvented attic) through one or more inputs (e.g., setting attic ventilation rate to zero). The software should provide the user with the option to indicate insulation at the roof deck and gables and soffits through the same or more entries. The software must model the attic space thermally correct under each condition and any ductwork in the attic must account for the attic conditions.

### **6.1.2.4 Cross Ventilation Option**

Normal window ventilation shall be modeled to occur at 5 air changes per hour, or adjusted based on open area (see equation 6.1.2.4.1), whenever the following conditions are met:

The outdoor temperature is between 71 and 78 degrees

The indoor temperature remains below 78 F

In DOE2 add a -4 to the end of the schedule to allow DOE2 to determine typical conditions prior to opening windows:

VENTING = SCHEDULE            THRU DEC 31 (ALL) (1,24) (-4).

In other programs use an algorithm that only allows ventilation to begin when a typical resident would. Although the DOE2 procedure written years ago at LBNL is undocumented, it prevents ventilation from starting within some time period after heating or cooling has been called or until the outdoor temperature is reasonably below the cooling set point.

The ventilation condition (windows open or closed) shall be set to not change between midnight and 6am to reflect most typical operating conditions.

$$\text{Equation 6.1.2.4.1: FVA} := (\text{Aw} / \text{Acfa}) * 0.25 * \text{Discoef} * 0.85$$

Where:

FVA = the fraction of ventilation area,

Aw = the sum of all the window areas in the conditioned part of the home,

Acfa = the sum of all the conditioned areas in the home

Discoef = the coefficient of the discharge rate of air, set to 0.60 for standard ventilation

0.25 and 0.85 are factors for window area open and screens

In DOE2 programs the vent method should be set to use the Sherman and Grimsrud method:

(VENT-METHOD= S-G) and the max vent rate should be set to 20 (MAX-VENT-RATE= 20). If other hourly modeling engines are used they should use the model closest to the DOE2 method described here.

When the specified code criteria for cross ventilation credit is met, the software should increase the window ventilation discharge coefficient from 0.6 to 0.75 compared to standard window ventilation. If modeling is done more simply, increase the window ventilation from 5 air changes per hour to 7 air changes per hour. The ventilation condition (windows open or closed) shall be set to not change between midnight and 6am to reflect most typical operating conditions.

#### **6.1.2.5 Whole House Fan Option**

When the specified code criteria for whole house fan is met, either a default of 300W per hour, or a user specified and reported energy use value from the installed unit, shall be included in the cooling energy performance when the unit runs. An air change rate of 15 air changes per hour shall be modeled during times when the whole house fan is operated. The operation (on or off) of the unit shall not change from midnight to 6am.

#### **6.1.2.6 Water Heat Recovery Credit**

The model should simulate a heat recovery unit. If using DOE-2 the COOL\_WASTE\_HEAT should be set to 0.07, the HEAT\_WASTE\_HEAT should be set to 0.09, and the DHW-TYPE = DESUPERHEAT. If the model is not

capable of modeling a heat recovery unit, simply adjust an EF of the main water heater using the factors in Table 6.1.2.6.1 (e.g., a 0.84 factor represents 16% savings) for annual energy use calculations.

Table 6.1.2.6.1	North	Central	South
Effectiveness Factor	0.86	0.78	0.61

**6.1.2.7 Dedicated Heat Pump Option**

To allow this option the model has to be able to simulate a heat pump water heater. In DOE2 set the water heater type to HEAT-PUMP. Also, the cooling dumped to the zone the heat pump water heater is located (e.g., garage) should be added to the heat balance of that space.

**6.1.2.8 Solar Water Heating Option**

The solar water heating effective efficiency shall be calculated using the following procedure.

First calculate the effective solar efficiency:

$$\text{Equation 6.1.2.8.1: } ESE := SEF * (a + (b * \text{Bedrooms}) + (c * \text{Bedrooms}^2));$$

Where:

ESE = Effective solar efficiency

SEF = The published Florida Solar Energy Factor

Bedrooms = the number of bedrooms in the house

a,b,c = coefficients as given in the table 6.1.2.8.1 by climate zone

Table 6.1.2.8.1	a	b	c	T <sub>main</sub> (F)
North	1.7595	-0.2767	0.0170	73.72
Central	1.9585	-0.3486	0.0212	77.88
South	2.2077	-0.4451	0.0287	82.13

Second, calculate the expected load

$$\text{Equation 6.1.2.8.2: } HW_{\text{load}} = \text{GPD} * 8.3 * (T_{\text{set}} - T_{\text{main}}) * 365 / 1000$$

Where:

$HW_{\text{load}}$  = Amount of heating needed in kBtu/year

GPD = gallons per day =  $30 + 10 * \text{Bedrooms}$

$T_{\text{set}}$  = Temperature set point = 120 F for 2010 Florida code

$T_{\text{main}}$  = Temperature of entering water from Table 6.1.2.8.1 and 8.3 is the conversion for Btu/gallon and 365 is days in the year and 1000 is Btu/kBtu.

Third, estimate an expected standard electric resistance system annual energy use

$$\text{Equation 6.1.2.8.3: } ESS_e = HW_{\text{load}} * 0.293 / EF_e$$

Where:

$ESS_e$  = Energy use of Standard System –Electric in kWh

$HW_{\text{load}}$  = Hot water load calculated in Equation 6.1.2.8.2

$EF_e = 0.92$

Fourth, calculate the expected solar system electric energy use according to equations 6.1.2.8.4

$$\text{Equation 6.1.2.8.4: } Solar_e = HW_{\text{load}} * 0.293 / ESE$$

Where:

$Solar_e$  = Energy use of Solar System with Electric backup in kWh

$HW_{\text{load}}$  = Hot water load calculated in Equation 6.1.2.8.2

ESE = Effective solar efficiency calculated in 6.1.2.8.1

The fifth step is to calculate the solar fraction for electric and fossil fuel systems

$$\text{Equation 6.1.2.8.5: } SF_e = (ESS_e - Solar_e) / ESS_e$$

$$\text{Equation 6.1.2.8.6: } SF_f = SF_e * EF_f / 0.90$$

Where:

$SF_e$  = Solar fraction for electric

$SF_f$  = Solar fraction for non-electric

$EF_f$  = Efficiency of the gas, propane, oil or other non-electric back up heater (fraction between 0 and 1)

This solar fraction can then be used to modify any annual detailed water heating algorithm that should be run for the non-solar backup as though there was no solar system

Equation 6.1.2.8.7:  $ADHW = ADHW_c(1 - SF)$

Where:

ADHW is the annual hot water energy use for the proposed home

$ADHW_c$  is the annual hot water energy use of the conventional, non-solar back-up system fully modeled

SF is the appropriate solar fraction,  $SF_e$  or  $SF_f$  calculated in the previous step

### 6.1.3 Multiple Systems

#### 6.1.3.1 Multiple Heating Systems

The software must be capable of modeling homes that use dual fuels for space heating (for example natural gas furnace in one part of the home and an electric heat pump in another part), applying the appropriate reference heating system to the standard design home for that portion of the home. Where two or more systems of the same fuel and system type are installed with different levels of efficiency serving different parts of the house, a capacity-weighted performance rating may be used to determine compliance. Alternatively the area served by each system may be modeled separately and total heating energy use combined.

#### 6.1.3.2 Multiple Cooling Systems

Where two or more systems of the same fuel and system type are installed with different levels of efficiency serving different parts of the house, a capacity-weighted performance rating may be used to determine compliance. Alternatively the area served by each system may be modeled separately and total cooling energy use combined.

#### 6.1.3.3 Multiple Water Heating Systems

Where two or more water heating systems are installed with different levels of efficiency, a single efficiency weighted by bedrooms served may be

calculated for determining compliance with this code. Alternatively the area served by each system may be modeled separately and total water heating energy use combined.



## 6.2 Minimum Capabilities

Compliance software programs (energy simulation tools) shall be capable of calculating the annual energy consumption of all building elements that differ between the *Standard Reference Design* and the *Proposed Design* and shall include the following capabilities (from B-1.2.1 of the Energy Code).

1. Computer generation of the *Standard Reference Design* using only the input for the *Proposed Design*. The calculation procedure shall not allow the user to directly modify the building component characteristics of the *Standard Reference Design*.
2. Calculation of whole-building (as a single *zone*) sizing for the heating and cooling equipment in the *Standard Reference Design* residence in accordance with Section 403.6 of the Energy Code.
3. Calculations that account for the effects of indoor and outdoor temperatures and part-load ratios on the performance of heating, ventilating and air-conditioning equipment based on climate and equipment sizing.
4. Printed *Building Code official* inspection checklist listing each of the *Proposed Design* component characteristics determined by the analysis to provide compliance, along with their respective performance ratings (e.g., *R*-value, *U*-factor, SHGC, HSPF, AFUE, SEER, EF, etc.)

## 6.3 Compliance Report

Compliance software program provisions and overall stringency shall be as described in Normative Appendix B of the Energy Code.

The compliance software program shall generate a Form 405 (see minimum required format in Appendix A of this Manual) report that documents that the Proposed Design complies with Section 405.3 of the Energy Code. The compliance documentation shall be submitted to the building official before a building permit is issued and shall include the following information:

1. Address or other identification of the residence;
2. An inspection checklist documenting the building component characteristics of the *Proposed Design* as listed in Appendix B, Table B-1.1.2(1) of the Energy Code. The inspection checklist shall show results for both the *Standard Reference Design* and the *Proposed Design*, and shall document all inputs entered by the user necessary to reproduce the results;
3. Name of individual completing the compliance report; and
4. Name and version of the compliance software tool

Exception: Multiple orientations. When an otherwise identical building model is offered in multiple orientations compliance for any orientation shall be permitted by documenting that the building meets the

performance requirements in each of the four cardinal (north, east, south and west) orientations.

The building code official shall require the following documents:

1. An Energy Performance Level (EPL) Display Card (minimum required format in Appendix A in this manual) signed by the builder providing the building component characteristics of the *Proposed Design* shall be provided to the purchaser of the home at time of title transfer.
2. Documentation of the component efficiencies used in the software calculations for the proposed building design.

The building official shall require that an EPL Display Card be completed and certified by the builder to be accurate and correct before final approval of the building for occupancy. Florida law (Section 553.9085, *Florida Statutes*) requires the EPL Display Card to be included as an addendum to each sales contract for both presold and non-presold residential buildings. The EPL Display Card contains information indicating the energy performance level and efficiencies of components installed in a dwelling unit. The building official shall verify that the EPL Display Card completed and signed by the builder accurately reflects the plans and specifications submitted to demonstrate compliance for the building.

## **6.4 Residential Energy Performance Testing**

This section specifies required capabilities that compliance software will be tested for. All of the required capabilities are described in terms of the capabilities and algorithms of the *2010 Florida Building Code, Energy Conservation*.

Compliance software programs shall account for the energy performance effects of all of the features described in the Energy Code.

The modeling procedures and assumptions described in this chapter apply to both the Standard Reference Design and Proposed Design. The requirements for the standard design include those that compliance software program shall apply to new features, altered existing features, unchanged existing features or all of the above. In order for a compliance software program to become approved, it shall, at a minimum, accept all of the required inputs.

### **6.4.1 Residential Accuracy Test Cases**

A specific version of HERS BESTEST for Florida was developed in request to DOE by the Florida Solar Energy Center (FSEC). In its request, FSEC noted that the Florida Building Energy-Efficiency Ratings Act of 1993 requires that Florida's rating system "be compatible with standard federal rating systems...where applicable...." The relevant proposed federal guidelines (DOE 10 CFR Part 437) will require that energy analysis tools used for energy ratings are tested according to the HERS BESTEST procedure.

The type of software testing used in this manual is based on inter-model comparisons and is one portion of an overall validation methodology that was first developed by National Renewable Energy Laboratory (NREL) in 1983 (Judkoff et al 1983/2008). The method has been further refined since then by NREL and others (Judkoff and Neymark 2006).

Comparative testing, as applied in the HERS Building Energy Simulation Test (HERS BESTEST) (Judkoff and Neymark 1995) and Florida HERS BESTEST (Judkoff and Neymark 1997) methods, includes a set of public domain reference programs that have already been subjected to extensive analytical, empirical, and inter-model testing.

### **6.4.2 Reference Test Cases**

The software verification test suite found in Section 2.2 of the RESNET document "Procedures for Verification of International Energy Conservation Code Performance Path Calculation Tools" dated September 2007 shall be utilized to verify the accuracy of the program.

1. Tier 1 of the HERS BESTEST and Florida HERS BESTEST as described below.
2. The Florida Energy Code Reference Home AutoGen Tests shall be used to verify the ability of the software tool to automatically generate the Florida Building Code's Standard Reference Design Home. The test document is in Appendix C of this manual.
3. HVAC tests – These tests verify the accuracy and consistency with which software tools predict the performance of HVAC equipment, including furnaces, air conditioners and air source heat pumps.
4. Duct distribution system efficiency tests – These tests verify the accuracy with which software tools calculate air distribution system losses. ASHRAE Standard 152 results are used as the basis of acceptance criteria for this test suite.
5. Hot water system performance tests – These tests determine the ability of the software to accurately predict hot water system energy use.

The Tier 1 HERS BESTEST and Florida HERS BESTEST software verification test cases are found in the following documents:

NREL/TP-550-23124a "Home Energy Rating System Building Energy Simulation Test for Florida (Florida-HERS BESTEST)," Volume 1 Tier 1 and Tier 2 Tests User's Manual, August 1997, Judkoff, Ron and Joel Neymark. <http://www.nrel.gov/docs/legosti/fy97/23124a.pdf>

NREL/TP-472-7332a "Home Energy Rating System Building Energy Simulation Test (HERS BESTEST)," Volume 1 Tier 1 and Tier 2 Tests User's Manual, November 1995, Judkoff, Ron and Joel Neymark. <http://www.nrel.gov/docs/legosti/fy96/7332a.pdf>

The Tier 2 tests included in these documents are not part of the testing requirements.

### 6.4.3 Testing Procedures

Using the test cases identified in the reference documents in 6.4.2 above,

- 1) Simulate the cases as outlined in the reference documents.
- 2) Record the results using the MS Excel spreadsheets provided by the Commission (see below).

- 3) A Software Vendor shall submit test results for Las Vegas, NV and Colorado Springs, CO (HERS BESTEST) and for Orlando, FL (Florida-HERS BESTEST). The source and data of the reference test results used for comparison must be submitted with the application.

Acceptance criteria for the Florida Energy Code Reference Home AutoGen Tests are provided in Appendix C, Section C.3

Results Forms in MS Excel Spreadsheet format are available on the Florida Building Commission's website, [www.floridabuilding.org](http://www.floridabuilding.org) for the verification tests specified in Section 6.4.2 above.

The Forms are:

Florida AutoGen\_results-form.xls  
HERS\_BESTEST\_results-form.xls  
FL-HERS\_BESTEST\_results-form.xls  
HVAC\_results-form.xls  
DSE\_results-form.xls  
DHW\_results-form.xls

A program may be considered as having passed successfully when its results fall inside the maximum and minimum ranges provided by these results forms.

## 7 Commercial Energy Software Compliance Program

Commercial suites of test include two types of verification. First is that the compliance software is capable of automatically generating the Standard Reference Design from user inputs. The Standard Reference Design generated at a minimum shall satisfy the requirements of Section 506 and Table 2.2 of the Normative Appendix B of the Energy Code. The second suite of tests involves the calculation of the Total Building Performance of a Proposed Design.

The goal of the manual is to provide methods that are as flexible and accurate as possible. This goal can best be achieved if the manual is a 'living document,' changing and growing as increasing amounts of information and better modeling methods become available.

### 7.1 General Requirements

Compliance software tools shall be capable of calculating the annual energy consumption of all building elements that differ between the *Standard Reference Design* and the *Proposed Design* and shall include the following capabilities.

1. Computer generation of the *Standard Reference Design* using only the input for the *Proposed Design*. The calculation procedure shall not allow the user to directly modify the building component characteristics of the *Standard Reference Design*.
2. Building operation for a full calendar year (8760 hours).
3. Climate data for a full calendar year (8760 hours) and shall reflect *approved* coincident hourly data for temperature, solar radiation, humidity and wind speed for the building location.
4. Ten or more thermal zones.
5. Thermal mass effects.
6. Hourly variations in occupancy, illumination, receptacle loads, thermostat settings, mechanical ventilation, HVAC equipment availability, service hot water usage and any process loads.
7. Part-load performance curves for mechanical equipment.
8. Capacity and efficiency correction curves for mechanical heating and cooling equipment.
9. Printed building code official inspection checklist listing each of the *Proposed Design* component characteristics from Table 506.5.1(1) determined by the analysis to provide compliance, along with their respective performance ratings (e.g., *R*-value, *U*-factor, SHGC, HSPF, AFUE, SEER, EF, etc.).

In accordance with Section 501.2 of the Energy Code, compliance software programs shall designate that the mandatory code provisions of Sections

502, 503, 504 and 505 of the Energy Code shall also be met as well as any relevant performance criteria in Section 506.

## 7.2 Performance Based Compliance

Compliance based on total building performance requires that a proposed building (Proposed Design) be shown to have an annual energy cost that is less than or equal to the annual energy cost of the Standard Reference Design. Energy prices shall be taken from a source approved by the Florida Building Commission. Non-depletable energy collected off site shall be treated and priced the same as purchased energy. Energy from non-depletable energy sources collected on site shall be omitted from the annual energy cost of the Proposed Design. Refer to Section 506 of the Energy Code; Normative Appendix B section B-2.1 states that the Standard Reference Design totals shall be adjusted by a factor of 0.8.

This section establishes criteria for compliance using total building performance. It may be employed for evaluating the compliance of all proposed designs, except designs with no mechanical system. The following systems and loads shall be included in determining the total building performance: heating systems, cooling systems, service water heating, fan systems, lighting power, receptacle loads and process loads.

### 7.2.1 Calculation Procedure

The *Standard Reference Design* and *Proposed Design* shall be configured and analyzed as specified by Table B-2.2 of the Energy Code. Except as specified by this section of the Energy Code, the *Standard Reference Design* and *Proposed Design* shall be configured and analyzed using identical methods and techniques. The *Standard Reference Design* totals for the Total Building Performance compliance method shall be adjusted by a factor of 0.80 to make the 20 percent more stringent than the "2007" Florida's *Standard Reference Design* features.

The *compliance software program* shall be capable of modeling:

- The *Standard Reference Design* building systems defined in 2010 *Florida Building Code*.
- The lighting, water heating, HVAC and miscellaneous equipment detailed in the Standards.
- All compulsory and required features as listed in Normative Appendix B and Section 506 of the Energy Code.
- The capability to model multiple zone systems shall allow at least 10 *thermal blocks* to be served by one multiple zone system.
- The *compliance software program* shall be capable of modeling plenum air return.

### 7.2.2 Calculation Methods

The *compliance software program* shall calculate the annual consumption of all end uses in buildings, including fuel and electricity for:

- HVAC (heating, cooling, fans, and ventilation);
- Lighting (both interior and exterior);
- Receptacles and miscellaneous electric;
- Service water heating;
- Process energy uses;
- Commercial refrigeration systems; and
- All other energy end uses that typically pass through the building meter

The *compliance software program* shall perform a simulation on an hourly time interval (at a minimum) over a one year period (8760 hours) with the ability to model changes in weather parameters, schedules, and other parameters for each hour of the year. This is typically achieved by specifying a 24-hour schedule for each day of the week plus holidays.

### 7.2.3 Error Handling

The software shall identify error conditions, prevent completion of the compliance analysis, and provide information to the user describing the error that has occurred and what steps the user should take to remedy the situation.

### 7.2.4 Climate Data

The *compliance software program* shall perform simulations using hourly values of climate data, such as temperature and humidity, derived from TMY3 (Typical Meteorological Year) climate data. The *compliance software program* shall calculate solar radiation on exterior surfaces on an hourly basis from the values of direct normal irradiance and diffuse horizontal irradiance contained in the climate data, taking ground reflectance into account.

Climate criteria for the performance-based Energy Code compliance methods are determined by climate data from all Florida TMY3 weather data collection stations. Energy Code calculations shall use the data collection site for the nearest city with respect to nearest to the building's location.

### 7.2.5 Utility Rates

The *compliance software program* shall be capable of simulating time-of-use rates and apply both demand and energy charges for each time period of the rate schedule. Rates are available from the Florida Public Service Commission, <http://www.floridapsc.com/Default.aspx>



## **7.3 Managing User Input**

This section addresses the processes of data entry and the validation of user input data that can be performed prior to and independent of the energy simulation.

### **7.3.1 Building Descriptor Inputs and Restrictions**

Building descriptors are discussed in Section 506 and listed in tabular form in Normative Appendix B of the Energy Code. All inputs shall conform to the input conditions and restrictions specified in Normative Appendix B and Section 506 of the Energy Code.

Four levels of restriction are specified for building descriptors. The most limiting restriction is a prescribed value. This is an input that must be used in all instances, with no variation. A critical default may be overridden, but when it is, the user must provide special documentation. A default is provided for convenience and may be overridden by the user with no special documentation. For many inputs there are no restrictions.

Restrictions apply to all required inputs. If the software provides a means for the user to input building descriptors listed as optional in Normative Appendix B (of the Energy Code), all input conditions and restrictions in Normative Appendix B and Section 506 (of the Energy Code) pertaining to those building descriptors shall be met.

### **7.3.2 User Interface**

The software is not required to provide a means for users to enter data for building descriptors designated as prescribed in Normative Appendix B and Section 506 (of the Energy Code). However, if the user is permitted to input values for prescribed inputs, the software must inform the user that a prescribed value and not the value input by the user will be used in the compliance.

No restrictions are specified for unsanctioned inputs. If the software uses unsanctioned inputs, the software documentation or help system shall specify the applicability of the building descriptors, its definition, the units in which it is expressed, restrictions on input for the Proposed Design, and, if applicable, how the building descriptor is defined for the Standard Reference Design building.

Compliance software programs may not provide default assumptions other than those specified in Normative Appendix B and Section 506 (of the Energy Code). However, the software may assist the user in describing the Proposed Design by displaying typical values for building descriptors, provided deliberate action by the user is necessary before a displayed value is used.

### 7.3.3 Compulsory Input Checks

The software shall check to ensure that valid entries have been made for all compulsory building descriptors before the user is permitted to proceed with the next step in the compliance process. Normative Appendix B and Section 506 (of the Energy Code) specify the compulsory building descriptors.

### 7.3.4 Handling of Missing Inputs

If a required input is missing or invalid, the software shall:

- notify the user that the input is missing or invalid,
- identify the input field(s) with missing or invalid data, and
- prevent the user from moving to the next step of the Compliance process.

The software may provide additional information designed to help the user correct the deficiency.

### 7.3.5 Validity Checks

The software shall check all user inputs to ensure that the following conditions are met:

- *Simulation Tool Limits*-Inputs do not exceed the minimums or maximums for the parameters permitted by the simulation engine.
- *Compliance Rule Limits*-Inputs do not exceed minimums or maximums for the descriptors specified in the Energy Codes.
- *Simulation Tool Discrete Options*-Inputs correspond with valid discrete or list options for parameters available in the simulation engine.
- *Compliance Rule Discrete Options*-Inputs correspond with valid discrete options provided for in Energy Codes.

### 7.3.6 Handling Invalid Input

When invalid data is entered, the software shall:

- notify the user of the invalid input,
- identify the nonconforming input field, and
- prevent execution of the next step of the Compliance process

The software may provide additional information designed to help the user correct the deficiency.

### 7.3.7 Consistency Checks

The consistency checks described above are intended to identify errors and oversights in user input and thereby help ensure that the building description is complete and interpretable by the energy analysis program. Examples of consistency checks include that window should not exceed the areas of wall in which they are contained and that the necessary plant

equipment has actually been connected to the secondary HVAC systems. The software may include additional consistency checks provided these additional consistency checks are clearly documented in the user documentation or on-line help.

### **7.3.8 Handling Inconsistent Input**

If the Proposed Design fails a consistency check, the software shall:

- notify the user that an inconsistency exists,
- identify the specific consistency check that has been failed,
- identify the inconsistent input fields, if feasible, and
- prevent execution of the next step of the Compliance process

The software may provide additional information designed to help the user correct the deficiency.

## **7.4 Documentation**

Compliance software tools shall be utilized to conform to the provisions of this section. Compliance software provisions and overall stringency shall be as described in Normative Appendix B of the Energy Code.

Compliance documentation includes the forms, reports and other information that is submitted to the building department with an application for a building permit. The purpose of the compliance documentation is to enable the plans examiner to verify that the building design complies with the Energy Code and to enable the field inspector to readily identify building features that are required for compliance.

### **7.4.1 Compliance Report**

The compliance software tools shall generate a Form 506 report (see preferred format in Appendix B) that documents that the *Proposed Design* has annual energy costs less than or equal to the annual energy costs of the *Standard Reference Design*. By standardizing the reports, all compliance authorities will be able to view the same building information and evaluate the project for certification. The required formats for building information reports are electronic (PDF) and hard copy. The hard copy standard reports will be in PDF (Portable Document File). Both report formats will be automatically generated by the software. Each page of the report will have a header with the project name and date.

The compliance documentation shall be submitted to the building code official before a building permit is issued and shall include the following information:

1. Address of the building (Section 506.4.1 of the Energy Code);

2. An inspection checklist documenting the building component characteristics of the Proposed Design as listed in Table B-2.2 of Appendix B of the Energy Code. The inspection checklist shall show the estimated annual energy cost for both the Standard Reference Design and the Proposed Design;
3. Name of individual completing the compliance report; and
4. Name and version of the compliance software tool.
5. Building information should be presented in three standard reports:
  1. Building Summary
  2. Energy Results
  3. Representations

#### **7.4.2 Additional Documentation**

As per Section 506.4.2 of the Florida Building Code, Energy Conservation, the building code official shall require the following documents:

1. Thermal zoning diagrams consisting of floor plans showing the thermal zoning scheme for the Proposed Design.
2. Input and output report(s) from the energy analysis simulation program containing the complete input and output files, as applicable. The output file shall include energy use totals and energy use by energy source and end-use served, total hours that space conditioning loads are not met and any errors or warning messages generated by the simulation tool as applicable;
3. An explanation of any error or warning messages appearing in the simulation tool output; and
4. A certification signed by the design professionals responsible under Florida law for the design of lighting, electrical, mechanical, and plumbing systems and the building shell providing the building component characteristics of the Proposed Design as given in Table B-2.2 of Appendix B of the Energy Code. See Section 103.1 of the *Florida Building Code*.

## 7.5 Commercial Verification Tests

This section contains the requirements that must be implemented by approved compliance software programs.

Software shall be tested according to *ASHRAE Standard 140-2007, Standard Method of Test for Evaluation of Building Energy Analysis Computer Programs*. Acceptance criteria for this test shall be in accordance with COMNET modeling guidelines and procedures.

The Standard 140 tests verify that the software is evaluating thermal loads and the response of the HVAC systems to thermal loads and other interior and ambient conditions in a manner that is acceptable. This method of testing is provided for analyzing and diagnosing building energy simulation software using software-to-software and software-to-quasi-analytical-solution comparisons. The methodology allows different building energy simulation programs, representing different degrees of modeling complexity, to be tested by comparing the predictions from other building energy programs to the simulation results provided by the Compliance Software in question.

## 8.1 References

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<http://www.energy.ca.gov/2008publications/CEC-400-2008-002/CEC-400-2008-002-CMF.PDF>

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COMNET, Commercial Buildings Energy Modeling Guidelines and Procedures, RESNET Publication 2010-001, August 16, 2010 <http://www.comnet.org/mgp/content/commercial-buildings-energy-modeling-guidelines-procedures-mgp>

ASHRAE's Standard 90.1-2010 User's Manual. American Society of Heating, Refrigerating and Air-Conditioning Engineers / 2011 / ISBN: 9781933742960

<http://www.ashrae.org/publications/page/90-1usersmanual>

Procedures for Verification of International Energy Conservation Code Performance Path Calculation Tools. RESNET Publication No. 07-003. March 2007

<http://resnet.us/>

Forms 405, 506 and EPL Card Templates. Florida Solar Energy Center, Cocoa Beach, FL.  
*EnergyGauge USA: Code Compliance and Home Energy Rating Software,*  
<http://www.energygauge.com/usares/default.htm>  
EnergyGauge Summit FlaCom, <http://www.energygauge.com/flacom/default.htm>

## **APPENDIX A**

### **RESIDENTIAL FORM 405**

#### **Minimum Required Content and Format**

*In accordance with Section 405.4 of the Florida Building Code, Energy Conservation*, the printout from computer programs approved by the Florida Building Commission for use as Energy Code compliance Form 405-2010 for residential applications shall contain all information required to determine Energy Code compliance for low-rise residential buildings, to include but not be limited to the following information. Compliance software program printout Form 405s should be consistent with the format described below. Associated forms for air infiltration and duct testing are advised.

A.1 An Administrative page of the printout should contain the following information:

- Form title and headings:
  - Form 405-2010
  - Florida Building Code, Energy Conservation
  - Residential Simulated Performance Alternative
  
- Project information box
  - Project name
  - Street address/city/state/zip
  - Owner
  - Design location
  - Builder name
  - Permit office
  - Permit number
  - Jurisdiction
  
- Summary of building components and features
  - New construction or existing
  - Single- or multiple-family
  - Number of units, if multiple family
  - Number of bedrooms
  - Whether it is a worst-case calculation
  - Window U-factor, SHGC and area for all windows in the building
  - Floor type, insulation R-value and area (or perimeter if slab)
  - Wall type, insulation R-value and area by type of wall
  - Ceiling types, insulation R-value and area by type of ceiling



- Duct location, R-value and type for supply, return and air handler
- Cooling system type, capacity and efficiency
- Heating system type, capacity and efficiency
- Hot water system type, capacity and efficiency
- Any conservation credits provided in the calculation per S. 405.6 of the Energy Code.
  
- Pass/Fail box
  - Percent glass to conditioned floor area
  - Total Proposed Design loads
  - Total Standard Reference Design loads
  - Whether the building Passes or Fails Energy Code compliance
  
- Compliance certification box
  - Statement, signature and date by the individual completing the compliance report as follows:
    - Statement: "I hereby certify that the plans and specifications covered by this calculation are in compliance with the *Florida Building Code, Energy Conservation.*"
      - PREPARED BY: \_\_\_\_\_
      - DATE: \_\_\_\_\_
  
  - Statement, signature and date by the owner of the building
    - Statement: "I hereby certify that this building, as designed, is in compliance with the *Florida Building Code, Energy Conservation.*"
      - OWNER/AGENT: \_\_\_\_\_
      - DATE: \_\_\_\_\_
  
  - Statement, signature and date by the code official reviewing the plans and compliance report:
    - Statement: "Review of the plans and specifications covered by this calculation indicates compliance with the *Florida Building Code, Energy Conservation.* Before construction is completed, this building will be inspected for compliance with Section 553.908, *Florida Statutes.*"
      - BUILDING OFFICIAL: \_\_\_\_\_
      - DATE: \_\_\_\_\_
  
- Name and version of the compliance software tool

A.2 Description of the building. Input Data to be consistent with the plans may include, but not be limited to:

- Project information
- Climate zone information by design location
- Floor type, materials, area or perimeter, R-value
- Roof type, materials area, solar absorptance, testing radiant barrier system, pitch, other relevant information as required by Energy Code
- Ceiling type, materials, R-value, area, truss type, framing fraction
- Wall type, orientation, whether it is exterior or adjacent, R-value, area, sheathing, framing fraction solar absorptance
- Door type, orientation U-value, area
- Window type(s), orientation, U-factor, SHGC, area, overhang, separation, interior shading, screening or storm windows
- Infiltration of the building (SLA, CFM, ACH, ELA, EqLA) and forced ventilation of the building (supply CFM, exhaust CFM, run time, fan watts)
- Garage area, insulation R-value if conditioned
- Cooling system type, efficiency, capacity, air flow, SHR, other relevant information
- Heating system type, efficiency, capacity, other relevant information
- Hot water system type, efficiency, capacity, any Energy Code-required credit requirements
- Duct and air handler location, R-value, area, leakage type and percent,  $Q_n$ , RLF
- Thermostat type and setting
- Ceiling fan use, if applicable

A.3 Energy Code Compliance Checklist may include, but not be limited to:

- Form name, compliance method
- Address and permit number of building permitted
- Infiltration reduction compliance summary checklist by component, Energy Code section, Energy Code requirements for said component and a space to be checked for Energy Code compliance for the following components:
  - Exterior windows & doors
  - Exterior & adjacent walls
  - Floors
  - Ceilings
  - Recessed lighting fixtures
  - Multiple-story house requirements
  - Any other infiltration requirements
- Other prescriptive measures checklist by component, Energy Code section and summary of requirement(s)
  - Water heaters requirements

- Swimming pool & Spa requirements
- Shower heads
- Air distribution system installation/insulation requirements
- HVAC control requirements
- Ceiling and common wall insulation minimums
- Lighting equipment requirements

#### A.4 Associated residential forms

- An EPL Display Card shall be printed from the compliance software program that contains the information on and is formatted as is the EPL Display Card contained in Appendix C of this Manual.
- Air barrier and insulation inspection component criteria
- Air distribution system test report
- Envelope leakage test report
- Form 402-2010, the Residential Building Thermal Envelope Approach, may be printed out as a function of the compliance software program for all applications including new residential buildings, additions to residential buildings, and new building systems installed in existing buildings.
- Alternate Form 402, the Total UA Alternative, may be printed out from the compliance software program if included in the software.

**RESIDENTIAL Form 405-2010, EPL Display Card, Energy Code-Required Form  
Printouts**

Note—data displayed in each Label is the recommended representation of data type, length and format.


# FLORIDA ENERGY EFFICIENCY CODE FOR BUILDING CONSTRUCTION

Florida Department of Business and Professional Regulation - Residential Performance Method

Project Name: Sample Addition Street: 346 Main Street City, State, Zip: Orlando , FL , 32922- Owner: OWNER Design Location: FL, Orlando	Builder Name: BUILDER Permit Office: Permit Number: Jurisdiction:
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Glass/Floor Area: 0.120	Total Proposed Modified Loads: 13.89 Total Baseline Loads: 17.57	PASS
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<p>I hereby certify that the plans and specifications covered by this calculation are in compliance with the Florida Energy Code.</p> <p>PREPARED BY: _____                  DATE: _____</p> <p>I hereby certify that this building, as designed, is in compliance with the Florida Energy Code.</p> <p>OWNER/AGENT: _____                  DATE: _____</p>	<p>Review of the plans and specifications covered by this calculation indicates compliance with the Florida Energy Code. Before construction is completed this building will be inspected for compliance with Section 553.908 Florida Statutes.</p> <div style="text-align: right;">  </div> <p>BUILDING OFFICIAL: _____                  DATE: _____</p>
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**PROJECT**

Title:	Sample Addition	Bedrooms:	3	Address Type:	Street Address
Building Type:	FLProp2010	Conditioned Area:	500	Lot #	
Owner:	OWNER	Total Stories:	1	Block/SubDivision:	
# of Units:	1	Worst Case:	No	PlatBook:	
Builder Name:	BUILDER	Rotate Angle:	0	Street:	346 Main Street
Permit Office:		Cross Ventilation:		County:	Orange
Jurisdiction:		Whole House Fan:		City, State, Zip:	Orlando , FL , 32922-
Family Type:	Single-family				
New/Existing:	Addition				
Comment:					

**CLIMATE**

✓	Design Location	TMY Site	IECC Zone	Design Temp 97.5 %	Design Temp 2.5 %	Int Design Temp Winter	Int Design Temp Summer	Heating Degree Days	Design Moisture	Daily Temp Range
_____	FL, Orlando	FL_ORLANDO_INTL_AR	2	41	91	75	70	526	44	Medium

**BLOCKS**

Number	Name	Area	Volume
1	Block1	500	4000

**SPACES**

Number	Name	Area	Volume	Kitchen	Occupants	Bedrooms	Infil ID	Cooled	Heated
1	Main	500	4000	Yes	4	3	1	Yes	Yes

**FLOORS**

✓	#	Floor Type	Room	Perimeter	R-Value	Area	Tile	Wood	Carpet	
_____	1	Slab-On-Grade Edge Insulatio	Main	45 ft	0	500 ft²	----	1	0	0

**ROOF**

✓	#	Type	Materials	Roof Area	Gable Area	Roof Color	Solar Absor.	SA Tested	Emitt	Emitt Tested	Deck Insul.	Pitch (deg)
_____	1	Hip	Composition shingles	542 ft²	0 ft²	Medium	0.96	No	0.9	No	0	22.6

**ATTIC**

✓	#	Type	Ventilation	Vent Ratio (1 in)	Area	RBS	IRCC
_____	1	Full attic	Vented	300	500 ft²	N	N

**CEILING**

✓	#	Ceiling Type	Space	R-Value	Area	Framing Frac	Truss Type
_____	1	Under Attic (Vented)	Main	30	500 ft²	0.11	Wood

### WALLS

✓	#	Ornt	Adjacent To	Wall Type	Space	Cavity R-Value	Width Ft	In	Height Ft	In	Area	Sheathing R-Value	Framing Fraction	Solar Absor.	Below Grade%
	1	SE	Exterior	Concrete Block - Int Insul	Main	5	20		9		180 ft²		0	0.6	0
	2	SW	Exterior	Concrete Block - Int Insul	Main	5	25		9		225 ft²		0	0.6	0

### DOORS

✓	#	Ornt	Door Type	Space	Storms	U-Value	Width Ft	In	Height Ft	In	Area
	1	SE	Wood	Main	None	0.460000	2.8		6.7		18.75999

### WINDOWS

Orientation shown is the entered, Proposed orientation.

✓	#	Ornt	Frame	Panes	NFRC	U-Factor	SHGC	Storms	Area	Overhang Depth	Separation	Int Shade	Screening
	1	SE	Metal	Low-E Double	Yes	0.55	0.35	N	30 ft²	1 ft 0 in	1 ft 0 in	HERS 2006	None
	2	SW	Metal	Low-E Double	Yes	0.55	0.35	N	30 ft²	1 ft 0 in	1 ft 0 in	HERS 2006	None

### INFILTRATION

#	Scope	Method	SLA	CFM 50	ELA	EqLA	ACH	ACH 50
1	BySpaces	Best Guess	0.000500	655.75	36	67.703	0.3650	9.8363

### HEATING SYSTEM

✓	#	System Type	Subtype	Efficiency	Capacity	Block	Ducts
	1	Electric Heat Pump	None	HSPF: 7.7	6.5 kBtu/hr	1	sys#1

### COOLING SYSTEM

✓	#	System Type	Subtype	Efficiency	Capacity	Air Flow	SHR	Block	Ducts
	1	Central Unit	Split	SEER: 16	8.8 kBtu/hr	360 cfm	0.75	1	sys#1

### HOT WATER SYSTEM

✓	#	System Type	EF	Cap	Use	SetPnt	Conservation
	1	Electric	0.92	40 gal	60 gal	120 deg	None

### SOLAR HOT WATER SYSTEM

✓	FSEC Cert #	Company Name	System Model #	Collector Model #	Collector Area	Storage Volume	FEF
	None	None			ft²		

### DUCTS

✓	#	---- Supply ----		---- Return ----		Leakage Type	Air Handler	CFM 25	Percent Leakage		QN	RLF	HVAC #	
		Location	R-Value	Area	Location				Area	%			%	Heat
	1	Attic	6	100 ft²	Attic	25 ft²	DSE=0.88	Main	0.0 cfm	0.00 %	0.00	0.60	1	1

### TEMPERATURES

Programable Thermostat: Y

Ceiling Fans:

Cooling	<input checked="" type="checkbox"/> Jan	<input checked="" type="checkbox"/> Feb	<input checked="" type="checkbox"/> Mar	<input checked="" type="checkbox"/> Apr	<input checked="" type="checkbox"/> May	<input checked="" type="checkbox"/> Jun	<input checked="" type="checkbox"/> Jul	<input checked="" type="checkbox"/> Aug	<input checked="" type="checkbox"/> Sep	<input checked="" type="checkbox"/> Oct	<input checked="" type="checkbox"/> Nov	<input checked="" type="checkbox"/> Dec
Heating	<input checked="" type="checkbox"/> Jan	<input checked="" type="checkbox"/> Feb	<input checked="" type="checkbox"/> Mar	<input checked="" type="checkbox"/> Apr	<input checked="" type="checkbox"/> May	<input checked="" type="checkbox"/> Jun	<input checked="" type="checkbox"/> Jul	<input checked="" type="checkbox"/> Aug	<input checked="" type="checkbox"/> Sep	<input checked="" type="checkbox"/> Oct	<input checked="" type="checkbox"/> Nov	<input checked="" type="checkbox"/> Dec
Venting	<input checked="" type="checkbox"/> Jan	<input checked="" type="checkbox"/> Feb	<input checked="" type="checkbox"/> Mar	<input checked="" type="checkbox"/> Apr	<input checked="" type="checkbox"/> May	<input checked="" type="checkbox"/> Jun	<input checked="" type="checkbox"/> Jul	<input checked="" type="checkbox"/> Aug	<input checked="" type="checkbox"/> Sep	<input checked="" type="checkbox"/> Oct	<input checked="" type="checkbox"/> Nov	<input checked="" type="checkbox"/> Dec

Thermostat Schedule: HERS 2006 Reference

Schedule Type	Hours											
	1	2	3	4	5	6	7	8	9	10	11	12
Cooling (WD)	AM	78	78	78	78	78	78	78	78	78	78	78
	PM	80	80	78	78	78	78	78	78	78	78	78
Cooling (WEH)	AM	78	78	78	78	78	78	78	78	78	78	78
	PM	78	78	78	78	78	78	78	78	78	78	78
Heating (WD)	AM	66	66	66	66	66	68	68	68	68	68	68
	PM	68	68	68	68	68	68	68	68	68	68	66
Heating (WEH)	AM	66	66	66	66	66	68	68	68	68	68	68
	PM	68	68	68	68	68	68	68	68	68	68	66



# Florida Code Compliance Checklist

Florida Department of Business and Professional Regulations  
Residential Whole Building Performance Method

ADDRESS: 346 Main Street  
Orlando, FL, 32922-

PERMIT #:

## MANDATORY REQUIREMENTS SUMMARY - See individual code sections for full details.

COMPONENT	SECTION	SUMMARY OF REQUIREMENT(S)	CHECK
Air leakage	402.4	To be caulked, gasketed, weatherstripped or otherwise sealed. Recessed lighting IC-rated as meeting ASTM E 283. Windows and doors = 0.30 cfm/sq.ft. Testing or visual inspection required. Fireplaces: gasketed doors & outdoor combustion air. Must complete envelope leakage report or visually verify Table 402.4.2.	
Thermostat & controls	403.1	At least one thermostat shall be provided for each separate heating and cooling system. Where forced-air furnace is primary system, programmable thermostat is required. Heat pumps with supplemental electric heat must prevent supplemental heat when compressor can meet the load.	
Ducts	403.2.2	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 Section 503.2.7.2 of this code.	
	403.3.3	Building framing cavities shall not be used as supply ducts.	
Water heaters	403.4	Heat trap required for vertical pipe risers. Comply with efficiencies in Table 403.4.3.2. Provide switch or clearly marked circuit breaker (electric) or shutoff (gas). Circulating system pipes insulated to = R-2 + accessible manual OFF switch.	
Mechanical ventilation	403.5	Homes designed to operate at positive pressure or with mechanical ventilation systems shall not exceed the minimum ASHRAE 62 level. No make-up air from attics, crawlspaces, garages or outdoors adjacent to pools or spas.	
Swimming Pools & Spas	403.9	Pool pumps and pool pump motors with a total horsepower (HP) of = 1 HP shall have the capability of operating at two or more speeds. Spas and heated pools must have vapor-retardant covers or a liquid cover or other means proven to reduce heat loss except if 70% of heat from site-recovered energy. Off/timer switch required. Gas heaters minimum thermal efficiency=78% (82% after 4/16/13). Heat pump pool heaters minimum COP= 4.0.	
Cooling/heating equipment	403.6	Sizing calculation performed & attached. Minimum efficiencies per Tables 503.2.3. Equipment efficiency verification required. Special occasion cooling or heating capacity requires separate system or variable capacity system. Electric heat >10kW must be divided into two or more stages.	
Ceilings/knee walls	405.2.1	R-19 space permitting.	


# FLORIDA ENERGY EFFICIENCY CODE FOR BUILDING CONSTRUCTION

Florida Department of Business and Professional Regulation - Residential Performance Method

Project Name: Sample 2 zone home Street: 123 Main Street City, State, Zip: Orlando , FL , 32922- Owner: OWNER Design Location: FL, Orlando	Builder Name: BUILDER Permit Office: Permit Number: Jurisdiction:
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Glass/Floor Area: 0.173	Total Proposed Modified Loads: 47.03	<b>PASS</b>
	Total Baseline Loads: 58.94	

<p>I hereby certify that the plans and specifications covered by this calculation are in compliance with the Florida Energy Code.</p> <p>PREPARED BY: _____                  DATE: _____</p> <p>I hereby certify that this building, as designed, is in compliance with the Florida Energy Code.</p> <p>OWNER/AGENT: _____                  DATE: _____</p>	<p>Review of the plans and specifications covered by this calculation indicates compliance with the Florida Energy Code. Before construction is completed this building will be inspected for compliance with Section 553.908 Florida Statutes.</p> <div style="text-align: center;">  </div> <p>BUILDING OFFICIAL: _____                  DATE: _____</p>
---	---

- Compliance requires certification by the air handler unit manufacturer that the air handler enclosure qualifies as certified factory-sealed in accordance with 403.2.2.1.1.
- Compliance requires an envelope leakage test report, by a Florida Class 1 Rater, in accordance with Table B-1.1.2.
- Compliance requires a roof absorptance test and a roof emittance test in accordance with 405.6.2
- Compliance requires an air distribution system test report, by a Florida Class 1 Rater, confirming system leakage to outdoors tested at 25 pascals pressure difference in accordance with 403.2.2.1. is not greater than (36 cfm:Duct#1) (36 cfm:Duct#2)

**PROJECT**

Title:	Sample 2 zone home	Bedrooms:	6	Address Type:	Street Address
Building Type:	FLProp2010	Conditioned Area:	2400	Lot #	
Owner:	OWNER	Total Stories:	2	Block/SubDivision:	
# of Units:	1	Worst Case:	No	PlatBook:	
Builder Name:	BUILDER	Rotate Angle:	0	Street:	123 Main Street
Permit Office:		Cross Ventilation:	No	County:	Orange
Jurisdiction:		Whole House Fan:	No	City, State, Zip:	Orlando , FL , 32922-
Family Type:	Single-family				
New/Existing:	New (From Plans)				
Comment:	High Performance Florida Home				

**CLIMATE**

✓	Design Location	TMY Site	IECC Zone	Design Temp 97.5 %	Design Temp 2.5 %	Int Design Temp Winter	Int Design Temp Summer	Heating Degree Days	Design Moisture	Daily Temp Range
_____	FL, Orlando	FL_ORLANDO_INTL_AR	2	41	91	75	70	526	44	Medium

**BLOCKS**

Number	Name	Area	Volume
1	Zone1	1200	9600
2	Zone2	1200	9600

**SPACES**

Number	Name	Area	Volume	Kitchen	Occupants	Bedrooms	Infil ID	Cooled	Heated
1	Main	1200	9600	Yes	3.5	3	1	Yes	Yes
2	2nd Floor	1200	9600	No	3.5	3	2	Yes	Yes

**FLOORS**

✓	#	Floor Type	Room	Perimeter	Perimeter R-Value	Area	Joist R-Value	Tile	Wood	Carpet
_____	1	Slab-On-Grade Edge Insulatio	Main	140 ft	0	1200 ft²	----	0.2	0	0.8
_____	2	Interior Floor	2nd Floor	----	----	1200 ft²	0	0	0	1

**ROOF**

✓	#	Type	Materials	Roof Area	Gable Area	Roof Color	Solar Absor.	SA Tested	Emitt Tested	Emitt Tested	Deck Insul.	Pitch (deg)
_____	1	Hip	Composition shingles	1300 ft²	0 ft²	White	0.85	Yes	0.9	Yes	0	22.6

**ATTIC**

✓	#	Type	Ventilation	Vent Ratio (1 in)	Area	RBS	IRCC
_____	1	Full attic	Vented	150	1200 ft²	N	N

### CEILING

✓	#	Ceiling Type	Space	R-Value	Area	Framing Frac	Truss Type
✓	1	Under Attic (Vented)	2nd Floor	30	1200 ft²	0.11	Wood

### WALLS

✓	#	Ornt	Adjacent To	Wall Type	Space	Cavity R-Value	Width Ft	In	Height Ft	In	Area	Sheathing R-Value	Framing Fraction	Solar Absor.	Below Grade%
✓	1	N	Exterior	Concrete Block - Int Insul	Main	5	40		8		320 ft²	0	0	0.5	0
✓	2	E	Exterior	Concrete Block - Int Insul	Main	5	30		8		240 ft²	0	0	0.5	0
✓	3	S	Exterior	Concrete Block - Int Insul	Main	5	40		8		320 ft²	0	0	0.5	0
✓	4	W	Exterior	Concrete Block - Int Insul	Main	5	8		8		64 ft²	0	0	0.5	0
✓	5	W	Garage	Frame - Wood	Main	13	22		8		176 ft²	0	0	0.01	0
✓	6	N	Exterior	Frame - Wood	2nd Floor	13	40		9		360 ft²	0	0.23	0.5	0
✓	7	E	Exterior	Frame - Wood	2nd Floor	13	30		9		270 ft²	0	0.23	0.5	0
✓	8	S	Exterior	Frame - Wood	2nd Floor	13	40		9		360 ft²	0	0.23	0.5	0
✓	9	W	Exterior	Frame - Wood	2nd Floor	13	30		8		240 ft²	0	0.23	0.5	0

### DOORS

✓	#	Ornt	Door Type	Space	Storms	U-Value	Width Ft	In	Height Ft	In	Area
✓	1	N	Insulated	Main	None	0.2	3		6	8	20 ft²
✓	2	S	Insulated	Main	None	0.2	3		6	8	20 ft²

### WINDOWS

Orientation shown is the entered, Proposed orientation.

✓	#	Ornt	Frame	Panes	NFRC	U-Factor	SHGC	Storms	Area	Overhang Depth	Separation	Int Shade	Screening
✓	1	N	Vinyl	Low-E Double	Yes	0.75	0.4	N	48 ft²	2 ft 0 in	10 ft 4 in	HERS 2006	None
✓	2	N	None	Glazed Block	No	0.6	0.6	N	24 ft²	2 ft 0 in	10 ft 4 in	HERS 2006	None
✓	3	E	Vinyl	Low-E Double	Yes	0.75	0.4	N	24 ft²	2 ft 0 in	10 ft 4 in	HERS 2006	None
✓	4	E	Vinyl	Low-E Double	Yes	0.75	0.4	N	24 ft²	2 ft 0 in	10 ft 4 in	HERS 2006	None
✓	5	S	Vinyl	Low-E Double	Yes	0.75	0.4	N	36 ft²	2 ft 0 in	10 ft 4 in	HERS 2006	None
✓	6	S	Vinyl	Low-E Double	Yes	0.5	0.35	N	40 ft²	2 ft 0 in	10 ft 4 in	HERS 2006	None
✓	7	W	Vinyl	Low-E Double	Yes	0.6	0.3	N	16 ft²	2 ft 0 in	10 ft 4 in	HERS 2006	None
✓	8	N	Vinyl	Low-E Double	Yes	0.75	0.5	N	36 ft²	2 ft 0 in	1 ft 4 in	HERS 2006	None
✓	9	E	Vinyl	Low-E Double	Yes	0.75	0.4	N	48 ft²	2 ft 0 in	1 ft 4 in	HERS 2006	None
✓	10	S	Vinyl	Low-E Double	Yes	0.75	0.4	N	48 ft²	2 ft 0 in	1 ft 4 in	HERS 2006	None
✓	11	S	Vinyl	Low-E Double	Yes	0.75	0.4	N	48 ft²	2 ft 0 in	1 ft 4 in	HERS 2006	None
✓	12	W	Vinyl	Low-E Double	Yes	0.6	0.3	N	24 ft²	2 ft 0 in	1 ft 4 in	HERS 2006	None

GARAGE															
✓	#	Floor Area	Ceiling Area	Exposed Wall Perimeter	Avg. Wall Height	Exposed Wall Insulation									
_____	1	384 ft²	384 ft²	64 ft	8 ft	13									
INFILTRATION															
#	Scope	Method	SLA	CFM 50	ELA	EqLA	ACH	ACH 50							
1	BySpaces	Proposed ACH(50)	0.000360	1133.1	62.208	116.99	0.3235	7.0821							
2	BySpaces	Proposed ACH(50)	0.000355	1120	61.486	115.63	0.3197	7							
HEATING SYSTEM															
✓	#	System Type	Subtype	Efficiency	Capacity	Block	Ducts								
_____	1	Electric Heat Pump	None	HSPF: 7.7	20 kBtu/hr	1	sys#1								
_____	2	Natural Gas Furnace	None	HSPF: 0.78	18 kBtu/hr	2	sys#2								
COOLING SYSTEM															
✓	#	System Type	Subtype	Efficiency	Capacity	Air Flow	SHR	Block	Ducts						
_____	1	Central Unit	None	SEER: 13	20 kBtu/hr	600 cfm	0.75	1	sys#1						
_____	2	Central Unit	None	SEER: 13	18 kBtu/hr	540 cfm	0.75	2	sys#2						
HOT WATER SYSTEM															
✓	#	System Type	EF	Cap	Use	SetPnt	Conservation								
_____	1	Electric	0.9	50 gal	90 gal	120 deg	None								
SOLAR HOT WATER SYSTEM															
✓	FSEC Cert #	Company Name	System Model #	Collector Model #	Collector Area	Storage Volume	FEF								
_____	None	None			ft²										
DUCTS															
✓	#	---- Supply ----			---- Return ----			Leakage Type	Air Handler	CFM 25	Percent Leakage	QN	RLF	HVAC #	
_____	1	Main	6	240 ft²	Main	60 ft²	Proposed Qn	Main	36.0 cfm	6.00 %	0.03	0.50	1	1	
_____	2	Attic	6	240 ft²	Attic	60 ft²	Proposed Qn	2nd Floor	36.0 cfm	6.67 %	0.03	0.50	2	2	

## TEMPERATURES

Programable Thermostat: Y

Ceiling Fans:

Cooling	<input checked="" type="checkbox"/>	Jan	<input checked="" type="checkbox"/>	Feb	<input checked="" type="checkbox"/>	Mar	<input checked="" type="checkbox"/>	Apr	<input checked="" type="checkbox"/>	May	<input checked="" type="checkbox"/>	Jun	<input checked="" type="checkbox"/>	Jul	<input checked="" type="checkbox"/>	Aug	<input checked="" type="checkbox"/>	Sep	<input checked="" type="checkbox"/>	Oct	<input checked="" type="checkbox"/>	Nov	<input checked="" type="checkbox"/>	Dec	<input checked="" type="checkbox"/>
Heating	<input checked="" type="checkbox"/>	Jan	<input checked="" type="checkbox"/>	Feb	<input checked="" type="checkbox"/>	Mar	<input checked="" type="checkbox"/>	Apr	<input checked="" type="checkbox"/>	May	<input checked="" type="checkbox"/>	Jun	<input checked="" type="checkbox"/>	Jul	<input checked="" type="checkbox"/>	Aug	<input checked="" type="checkbox"/>	Sep	<input checked="" type="checkbox"/>	Oct	<input checked="" type="checkbox"/>	Nov	<input checked="" type="checkbox"/>	Dec	<input checked="" type="checkbox"/>
Venting	<input checked="" type="checkbox"/>	Jan	<input checked="" type="checkbox"/>	Feb	<input checked="" type="checkbox"/>	Mar	<input checked="" type="checkbox"/>	Apr	<input checked="" type="checkbox"/>	May	<input checked="" type="checkbox"/>	Jun	<input checked="" type="checkbox"/>	Jul	<input checked="" type="checkbox"/>	Aug	<input checked="" type="checkbox"/>	Sep	<input checked="" type="checkbox"/>	Oct	<input checked="" type="checkbox"/>	Nov	<input checked="" type="checkbox"/>	Dec	<input checked="" type="checkbox"/>

Thermostat Schedule: HERS 2006 Reference

Hours

Schedule Type		1	2	3	4	5	6	7	8	9	10	11	12
Cooling (WD)	AM	78	78	78	78	78	78	78	78	78	80	80	80
	PM	80	80	78	78	78	78	78	78	78	78	78	78
Cooling (WEH)	AM	78	78	78	78	78	78	78	78	78	78	78	78
	PM	78	78	78	78	78	78	78	78	78	78	78	78
Heating (WD)	AM	66	66	66	66	66	68	68	68	68	68	68	68
	PM	68	68	68	68	68	68	68	68	68	68	68	66
Heating (WEH)	AM	66	66	66	66	66	68	68	68	68	68	68	68
	PM	68	68	68	68	68	68	68	68	68	68	68	66

# Florida Code Compliance Checklist

Florida Department of Business and Professional Regulations  
Residential Whole Building Performance Method

ADDRESS: 123 Main Street  
Orlando, FL, 32922-

PERMIT #:

## MANDATORY REQUIREMENTS SUMMARY - See individual code sections for full details.

COMPONENT	SECTION	SUMMARY OF REQUIREMENT(S)	CHECK
Air leakage	402.4	To be caulked, gasketed, weatherstripped or otherwise sealed. Recessed lighting IC-rated as meeting ASTM E 283. Windows and doors = 0.30 cfm/sq.ft. Testing or visual inspection required. Fireplaces: gasketed doors & outdoor combustion air. Must complete envelope leakage report or visually verify Table 402.4.2.	
Thermostat & controls	403.1	At least one thermostat shall be provided for each separate heating and cooling system. Where forced-air furnace is primary system, programmable thermostat is required. Heat pumps with supplemental electric heat must prevent supplemental heat when compressor can meet the load.	
Ducts	403.2.2 403.3.3	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 Section 503.2.7.2 of this code. Building framing cavities shall not be used as supply ducts.	
Water heaters	403.4	Heat trap required for vertical pipe risers. Comply with efficiencies in Table 403.4.3.2. Provide switch or clearly marked circuit breaker (electric) or shutoff (gas). Circulating system pipes insulated to = R-2 + accessible manual OFF switch.	
Mechanical ventilation	403.5	Homes designed to operate at positive pressure or with mechanical ventilation systems shall not exceed the minimum ASHRAE 62 level. No make-up air from attics, crawlspaces, garages or outdoors adjacent to pools or spas.	
Swimming Pools & Spas	403.9	Pool pumps and pool pump motors with a total horsepower (HP) of = 1 HP shall have the capability of operating at two or more speeds. Spas and heated pools must have vapor-retardant covers or a liquid cover or other means proven to reduce heat loss except if 70% of heat from site-recovered energy. Off/timer switch required. Gas heaters minimum thermal efficiency=78% (82% after 4/16/13). Heat pump pool heaters minimum COP= 4.0.	
Cooling/heating equipment	403.6	Sizing calculation performed & attached. Minimum efficiencies per Tables 503.2.3. Equipment efficiency verification required. Special occasion cooling or heating capacity requires separate system or variable capacity system. Electric heat >10kW must be divided into two or more stages.	
Ceilings/knee walls	405.2.1	R-19 space permitting.	

# ENERGY PERFORMANCE LEVEL (EPL) DISPLAY CARD

**ESTIMATED ENERGY PERFORMANCE INDEX\* = 80**

The lower the EnergyPerformance Index, the more efficient the home.

123 Main Street, Orlando, FL, 32922-

<p>1. New construction or existing 2. Single family or multiple family 3. Number of units, if multiple family 4. Number of Bedrooms 5. Is this a worst case? 6. Conditioned floor area (ft<sup>2</sup>)</p>	<p>New (From Plans) Single-family 1 6 No 2400</p>	<p>9. Wall Types a. Frame - Wood, Exterior b. Concrete Block - Int Insul, Exterior c. Frame - Wood, Adjacent d. N/A</p>	<p>Insulation R=13.0 R=5.0 R=13.0 R=</p>	<p>Area 1230.00 ft<sup>2</sup> 944.00 ft<sup>2</sup> 176.00 ft<sup>2</sup> ft<sup>2</sup></p>																													
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<p>Area Weighted Average Overhang Depth: Area Weighted Average SHGC:</p>	<p>2.000 ft. 0.406</p>	<p>14. Hot water systems a. Electric b. Conservation features None</p>	<p>Cap: 50 gallons EF: 0.9</p>	<p>Pstat</p>																													
<p>Area Weighted Average Overhang Depth: Area Weighted Average SHGC:</p>	<p>2.000 ft. 0.406</p>	<p>15. Credits</p>	<p>Pstat</p>	<p>Pstat</p>																													

I certify that this home has complied with the Florida Energy Efficiency Code for Building Construction through the above energy saving features which will be installed (or exceeded) in this home before final inspection. Otherwise, a new EPL Display Card will be completed based on installed Code compliant features.

Builder Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
Address of New Home: \_\_\_\_\_ City/FL Zip: \_\_\_\_\_



\*Note: This is not a Building Energy Rating. If your Index is below 70, your home may qualify for energy efficient mortgage (EEM) incentives if you obtain a Florida EnergyGauge Rating. Contact the EnergyGauge Hotline at (321) 638-1492 or see the EnergyGauge web site at [energygauge.com](http://energygauge.com) for information and a list of certified Raters. For information about the Florida Building Code, Energy Conservation, contact the Florida Building Commission's support staff.

\*\*Label required by Section 303.1.3 of the Florida Building Code, Energy Conservation, if not DEFAULT.

\*\* Software Title and Version Here \*\* Section 405.4.1 Compliant Software



# ENERGY PERFORMANCE LEVEL (EPL) DISPLAY CARD

**ESTIMATED ENERGY PERFORMANCE INDEX\* = 79**

The lower the EnergyPerformance Index, the more efficient the home.

346 Main Street, Orlando, FL, 32922-

<p>1. New construction or existing                      Addition</p> <p>2. Single family or multiple family                  Single-family</p> <p>3. Number of units, if multiple family              1</p> <p>4. Number of Bedrooms                                3(1)</p> <p>5. Is this a worst case?                                No</p> <p>6. Conditioned floor area (ft<sup>2</sup>)                      500</p> <p>7. Windows**</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 15%;"></td> <td style="width: 45%;">Description</td> <td style="width: 40%;">Area</td> </tr> <tr> <td>a. U-Factor:</td> <td>Dbl, U=0.55</td> <td>60.00 ft<sup>2</sup></td> </tr> <tr> <td>SHGC:</td> <td>SHGC=0.35</td> <td></td> </tr> <tr> <td>b. U-Factor:</td> <td>N/A</td> <td>ft<sup>2</sup></td> </tr> <tr> <td>SHGC:</td> <td></td> <td></td> </tr> <tr> <td>c. U-Factor:</td> <td>N/A</td> <td>ft<sup>2</sup></td> </tr> <tr> <td>SHGC:</td> <td></td> <td></td> </tr> <tr> <td>d. U-Factor:</td> <td>N/A</td> <td>ft<sup>2</sup></td> </tr> <tr> <td>SHGC:</td> <td></td> <td></td> </tr> <tr> <td colspan="2">Area Weighted Average Overhang Depth:</td> <td>1.000 ft.</td> </tr> <tr> <td colspan="2">Area Weighted Average SHGC:</td> <td>0.350</td> </tr> </table> <p>8. Floor Types</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 15%;"></td> <td style="width: 45%;">Insulation</td> <td style="width: 40%;">Area</td> </tr> <tr> <td>a. Slab-On-Grade Edge Insulation</td> <td>R=0.0</td> <td>500.00 ft<sup>2</sup></td> </tr> <tr> <td>b. N/A</td> <td>R=</td> <td>ft<sup>2</sup></td> </tr> <tr> <td>c. N/A</td> <td>R=</td> <td>ft<sup>2</sup></td> </tr> </table>		Description	Area	a. U-Factor:	Dbl, U=0.55	60.00 ft <sup>2</sup>	SHGC:	SHGC=0.35		b. U-Factor:	N/A	ft <sup>2</sup>	SHGC:			c. U-Factor:	N/A	ft <sup>2</sup>	SHGC:			d. U-Factor:	N/A	ft <sup>2</sup>	SHGC:			Area Weighted Average Overhang Depth:		1.000 ft.	Area Weighted Average SHGC:		0.350		Insulation	Area	a. Slab-On-Grade Edge Insulation	R=0.0	500.00 ft <sup>2</sup>	b. N/A	R=	ft <sup>2</sup>	c. N/A	R=	ft <sup>2</sup>	<p>9. Wall Types</p> <p>a. Concrete Block - Int Insul, Exterior</p> <p>b. N/A</p> <p>c. N/A</p> <p>d. N/A</p> <p>10. Ceiling Types</p> <p>a. Under Attic (Vented)</p> <p>b. N/A</p> <p>c. N/A</p> <p>11. Ducts</p> <p>a. Sup: Attic, Ret: Attic, AH: Main</p> <p>12. Cooling systems</p> <p>a. Central Unit</p> <p>13. Heating systems</p> <p>a. Electric Heat Pump</p> <p>14. Hot water systems - None (Baseline assumed)</p> <p>a. Electric</p> <p>b. Conservation features None</p> <p>15. Credits</p>	<table border="0" style="width: 100%;"> <tr> <td style="width: 15%;"></td> <td style="width: 15%;">Insulation</td> <td style="width: 70%;">Area</td> </tr> <tr> <td></td> <td>R=5.0</td> <td>405.00 ft<sup>2</sup></td> </tr> <tr> <td></td> <td>R=</td> <td>ft<sup>2</sup></td> </tr> <tr> <td></td> <td>R=</td> <td>ft<sup>2</sup></td> </tr> <tr> <td></td> <td>R=</td> <td>ft<sup>2</sup></td> </tr> <tr> <td></td> <td>Insulation</td> <td>Area</td> </tr> <tr> <td></td> <td>R=30.0</td> <td>500.00 ft<sup>2</sup></td> </tr> <tr> <td></td> <td>R=</td> <td>ft<sup>2</sup></td> </tr> <tr> <td></td> <td>R=</td> <td>ft<sup>2</sup></td> </tr> <tr> <td></td> <td></td> <td>R    ft<sup>2</sup></td> </tr> <tr> <td></td> <td></td> <td>6   100</td> </tr> <tr> <td></td> <td>kBtu/hr</td> <td>Efficiency</td> </tr> <tr> <td></td> <td>8.8</td> <td>SEER:16.00</td> </tr> <tr> <td></td> <td>kBtu/hr</td> <td>Efficiency</td> </tr> <tr> <td></td> <td>6.5</td> <td>HSPF:7.70</td> </tr> <tr> <td></td> <td></td> <td>Cap: N/A</td> </tr> <tr> <td></td> <td></td> <td>EF: 0.92</td> </tr> <tr> <td></td> <td></td> <td>Pstat</td> </tr> </table>		Insulation	Area		R=5.0	405.00 ft <sup>2</sup>		R=	ft <sup>2</sup>		R=	ft <sup>2</sup>		R=	ft <sup>2</sup>		Insulation	Area		R=30.0	500.00 ft <sup>2</sup>		R=	ft <sup>2</sup>		R=	ft <sup>2</sup>			R    ft <sup>2</sup>			6   100		kBtu/hr	Efficiency		8.8	SEER:16.00		kBtu/hr	Efficiency		6.5	HSPF:7.70			Cap: N/A			EF: 0.92			Pstat
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Builder Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Address of New Home: \_\_\_\_\_ City/FL Zip: \_\_\_\_\_



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\*\*Label required by Section 303.1.3 of the Florida Building Code, Energy Conservation, if not DEFAULT.

**TABLE 402.4.2**

**AIR BARRIER AND INSULATION INSPECTION COMPONENT CRITERIA**

Project Name: Sample Addition Street: 346 Main Street City, State, Zip: Orlando , FL , 32922- Owner: OWNER Design Location: FL, Orlando		Builder Name: BUILDER Permit Office: Permit Number: Jurisdiction:	
<b>COMPONENT</b>	<b>CRITERIA</b>	<b>CHECK</b>	
Air barrier and thermal barrier	<p>Exterior thermal envelope insulation for framed walls is installed in substantial contact and continuous alignment with building envelope air barrier.</p> <p>Breaks or joints in the air barrier are filled or repaired.</p> <p>Air-permeable insulation is not used as a sealing material.</p> <p>Air-permeable insulation is inside of an air barrier.</p>		
Ceiling/attic	<p>Air barrier in any dropped ceiling/soffit is substantially aligned with insulation and any gaps are sealed.</p> <p>Attic access (except unvented attic), knee wall door, or drop down stair is sealed.</p>		
Walls	<p>Corners and headers are insulated.</p> <p>Junction of foundation and sill plate is sealed.</p>		
Windows and doors	<p>Space between window/door jambs and framing is sealed.</p>		
Rim joists	<p>Rim joists are insulated and include an air barrier.</p>		
Floors (including above-garage and cantilevered floors)	<p>Insulation is installed to maintain permanent contact with underside of subfloor decking.</p>		
Crawl space walls	<p>Insulation is permanently attached to walls.</p> <p>Exposed earth in unvented crawl spaces is covered with Class I</p>		
Shafts, penetrations	<p>Duct shafts, utility penetrations, knee walls and flue shafts opening to exterior or unconditioned space are sealed.</p>		
Narrow cavities	<p>Batts in narrow cavities are cut to fit, or narrow cavities are filled by sprayed/blown insulation.</p>		
Garage separation	<p>Air sealing is provided between the garage and conditioned spaces.</p>		
Recessed lighting	<p>Recessed light fixtures are air tight, IC rated, and sealed to drywall. Exception—fixtures in conditioned space.</p>		
Plumbing and wiring	<p>Insulation is placed between outside and pipes. Batt insulation is cut to fit around wiring and plumbing, or sprayed/blown insulation</p>		
Shower/tub on exterior wall	<p>Showers and tubs on exterior walls have insulation and an air barrier separating them from the exterior wall.</p>		
Electrical/phone box on	<p>Air barrier extends behind boxes or air sealed-type boxes are installed.</p>		
Common wall	<p>Air barrier is installed in common wall between dwelling units.</p>		
HVAC register boots	<p>HVAC register boots that penetrate building envelope are sealed to subfloor or drywall.</p>		
Fireplace	<p>Fireplace walls include an air barrier.</p>		

# FLORIDA ENERGY EFFICIENCY CODE FOR BUILDING CONSTRUCTION

## Air Distribution System Test Report

Project Name: Sample Addition  
 Street: 346 Main Street  
 City, State, Zip: Orlando , FL , 32922-  
 Owner: OWNER  
 Design Location: FL, Orlando

Builder Name: BUILDER  
 Permit Office:  
 Permit Number:  
 Jurisdiction:

### Air Distribution System Leakage Test Results

CFM25 Air Distribution System Leakage Test Values		
Line	System	Duct Leakage to Outdoors
1	System 1	_____cfm25(out)
2	System 2	_____cfm25(out)
3	System 3	_____cfm25(out)
4	System 4	_____cfm25(out)
5	<b>Total House Duct System Leakage</b>	Sum lines 1-4 _____ Divide by _____ (Total Conditioned Floor Area) = _____ <b>(Q<sub>n,out</sub>)</b>  To qualify as "substantially leak free" Q <sub>n,out</sub> must be less than or equal to 0.03.

I hereby certify that the above duct testing performance results demonstrate compliance with the Florida Energy Code requirements in accordance with Section 403.2.2.1.

**Signature:** \_\_\_\_\_

**Printed Name:** \_\_\_\_\_

**Florida Rater Certification #:** \_\_\_\_\_

**DATE:** \_\_\_\_\_

Florida Building Code requires that testing to confirm duct leakage be performed by a Class 1 Florida Energy Gauge Certified Energy Rater. Certified Florida Class 1 raters can be found at:  
<http://energygauge.com/search.htm>



**BUILDING OFFICIAL:** \_\_\_\_\_

**DATE:** \_\_\_\_\_

# FLORIDA ENERGY EFFICIENCY CODE FOR BUILDING CONSTRUCTION

## Envelope Leakage Test Report

Project Name: Sample Addition	Builder Name: BUILDER
Street: 346 Main Street	Permit Office:
City, State, Zip: Orlando , FL , 32922-	Permit Number:
Owner: OWNER	Jurisdiction:
Design Location: FL, Orlando	

### Envelope Leakage Test Results

Regression Data:

C: \_\_\_\_\_ n: \_\_\_\_\_ R: \_\_\_\_\_

Multi Point Test Data:

	HOUSE PRESSURE	FLOW:
1	Pa	cfm
2	Pa	cfm
3	Pa	cfm
4	Pa	cfm
5	Pa	cfm
6	Pa	cfm

### Leakage Characteristics

CFM(50): \_\_\_\_\_

ELA: \_\_\_\_\_

EqLA: \_\_\_\_\_

ACH: \_\_\_\_\_

ACH(50): \_\_\_\_\_

SLA: \_\_\_\_\_

**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 33.5 psf (50 Pa). 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.

I hereby certify that the above envelope leakage performance results demonstrate compliance with Florida Energy Code requirements in accordance with Section Table B-1.1.2.

**Signature:** \_\_\_\_\_

**Printed Name:** \_\_\_\_\_

**Florida Rater Certification #:** \_\_\_\_\_

**DATE:** \_\_\_\_\_

Florida Building Code requires testing to confirm envelope leakage be performed by a Class 1 Florida Energy Gauge Certified Energy Rater. Certified Florida Class 1 raters can be found at: <http://energygauge.com/search.htm>



**BUILDING OFFICIAL:** \_\_\_\_\_

**DATE:** \_\_\_\_\_

## APPENDIX B

### Commercial and High-Rise Residential

#### Minimum Required Content and Format

##### FORM 506-2010

*In accordance with Section 506.4.1 of the Florida Building Code, Energy Conservation*, the printout from computer programs approved by the Florida Building Commission for use as Energy Code compliance Form 506-2010 for commercial and high-rise residential applications shall contain all information required to determine Energy Code compliance for said buildings, to include but not be limited to the following information. Compliance software program printout Form 506s should be consistent with the format described below should contain, but not be limited to, the following information and be consistent with the format described below.

B.1 An Administrative page of the printout should contain the following information:

- Form title and headings:
  - Form 506-2010
  - Florida Building Code, Energy Conservation
  - Total Building Performance for Commercial and High-Rise Residential Buildings
  
- Project information box
  - Project name
  - Street address/city/state/zip
  - Type of building (occupancy)
  - Class of building (new, renovation, etc.)
  - Conditioned floor area
  - Number of stories
  - Owner
  - Design location
  - Builder name
  - Permit office/jurisdiction
  - Permit number

B.2 Output project data

- Climate zone information by design location
  
- Building End Uses: Proposed Design vs. Standard Reference Design

- Electricity
- Area lights
- Miscellaneous equipment
- Pumps & miscellaneous
- Space cooling
- Vent fans
- Natural gas
- Space heat
  
- External lighting compliance
- Lighting controls compliance
- System report compliance
- Plant compliance
- Water heater compliance
- Piping system compliance
- Other required compliance requirements

### B.3 Compliance Summary

- Whether the building Passes or Fails Energy Code compliance
  - Gross Energy Cost (in dollars)
  - Lighting controls
  - External lighting
  - HVAC system
  - Plant
  - Water heating systems
  - Piping systems
  - Inspection checklist
  
- Any conservation credits provided in the calculation per S. 506.3.3 of the Energy Code.
  
- Compliance certification box
  - Statement, signature and date by the individual completing the compliance report as follows:
    - Statement: "I hereby certify that the plans and specifications covered by this calculation are in compliance with the *Florida Building Code, Energy Conservation.*"
      - PREPARED BY: \_\_\_\_\_
      - DATE: \_\_\_\_\_
  
  - Statement, signature and date by the owner of the building

- Statement: "I hereby certify that this building, as designed, is in compliance with the *Florida Building Code, Energy Conservation.*"
  - OWNER/AGENT: \_\_\_\_\_
  - DATE: \_\_\_\_\_
- Where Florida law requires a design to be performed by a registered design professional, said design professional shall certify compliance of building by signing and providing their registration number:
  - Architect: \_\_\_\_\_ Registration No.: \_\_\_\_\_
  - Electrical Designer: \_\_\_\_\_ Registration No: \_\_\_\_\_
  - Lighting Designer: \_\_\_\_\_ Registration No: \_\_\_\_\_
  - Mechanical Designer: \_\_\_\_\_ Registration No: \_\_\_\_\_
  - Plumbing Designer: \_\_\_\_\_ Registration No: \_\_\_\_\_
- Statement, signature and date by the code official reviewing the plans and compliance report:
  - Statement: "Review of the plans and specifications covered by this calculation indicates compliance with the *Florida Building Code, Energy Conservation.* Before construction is completed, this building will be inspected for compliance with Section 553.908, *Florida Statutes.*"
    - BUILDING OFFICIAL: \_\_\_\_\_
    - DATE: \_\_\_\_\_
- Name and version of the compliance software tool

B. 4 Input data. Description of the building; data to be consistent with the plans may include, but not be limited to:

- Project information
  - Zones
  - Spaces
  - Lighting
  - Walls
  - Windows
  - Doors
  - Roofs
  - Skylights
  - Floors
  - Systems
  - Plant
  - Water heaters
  - Exterior lighting

- Piping
- Fenestration used
- Materials used
- Constructs used
- 

#### B.5 Energy Code Compliance Checklist

- Form name, compliance method
- Address and permit number of building permitted
- Other prescriptive measures checklist by component, Energy Code section and summary of requirement(s)
  - Operations manual
  - Air infiltration
  - Dehumidification
  - HVAC efficiency
  - HVAC controls
  - Ventilation
  - Piping insulation
  - Duct insulation and design
  - Balancing
  - Water heaters requirements
  - Swimming pools
  - Shower heads
  - Lighting controls

#### B.6 Other forms that may be printed out from the commercial compliance software program:

- Form 502-2010 for either shell buildings or renovations/new building systems.



**COMMERCIAL and HIGH-RISE RESIDENTIAL -Form 506-2010 Printouts**

Note: Data displayed in each Label is a recommended representation of data type, length and format.

# Florida Energy Efficiency Code For Building Construction

\*\* Software Title and Version to go here \*\*, Effective Date: March 15, 2012 -- Form 506-2010

## Total Building Performance Method for Commercial Buildings

### PROJECT SUMMARY

**Short Desc:** RefProj

**Description:** New Project

**Owner:** Enter Owner's name here

**Address1:** 1234 Any Street

**City:** Anywhere

**Address2:** Enter Address here

**State:** FL

**Zip:** 12345

**Type:** Office

**Class:** New Finished building

**Jurisdiction:** ALACHUA COUNTY, ALACHUA COUNTY, FL (111000)

**Conditioned Area:** 10000 SF

**Conditioned & UnConditioned Area:** 10000 SF

**No of Stories:** 1

**Area entered from Plans** 0 SF

**Permit No:** 0

**Max Tonnage** 50

**If different, write in:** \_\_\_\_\_

## Compliance Summary

<b>Component</b>	<b>Design</b>	<b>Criteria</b>	<b>Result</b>
Gross Energy Cost (in \$)	5,005.0	8,885.0	<b>PASSED</b>
LIGHTING CONTROLS			<b>PASSES</b>
EXTERNAL LIGHTING			<b>FAILS</b>
HVAC SYSTEM			<b>FAILS</b>
PLANT			<b>None Entered</b>
WATER HEATING SYSTEMS			<b>FAILS</b>
PIPING SYSTEMS			<b>FAILS</b>
Met all required compliance from Check List?			<b>Yes/No/NA</b>

### IMPORTANT MESSAGE

Info 5009 -- -- -- An input report of this design building must be submitted along with this Compliance Report

## CERTIFICATIONS

I hereby certify that the plans and specifications covered by this calculation are in compliance with the Florida Energy Code

Prepared By: John Doe

Building Official: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

I certify that this building is in compliance with the FLorida Energy Efficiency Code

Owner Agent: \_\_\_\_\_

Date: \_\_\_\_\_

If Required by Florida law, I hereby certify (\*) that the system design is in compliance with the Florida Energy Efficiency Code

Architect: \_\_\_\_\_

Reg No: \_\_\_\_\_

Electrical Designer: \_\_\_\_\_

Reg No: \_\_\_\_\_

Lighting Designer: \_\_\_\_\_

Reg No: \_\_\_\_\_

Mechanical Designer: \_\_\_\_\_

Reg No: \_\_\_\_\_

Plumbing Designer: \_\_\_\_\_

Reg No: \_\_\_\_\_

(\*) Signature is required where Florida Law requires design to be performed by registered design professionals.

Project: RefProj  
 Title: New Project  
 Type: Office  
 (WEA File: FL\_GAINESVILLE\_REGIONAL\_AP.tm3)

**Building End Uses**

	1) Proposed	2) Baseline
Total	347.80	744.30
	\$5,005	\$11,107
ELECTRICITY(MBtu/kWh/\$)	301.00	677.00
	88193	198349
	\$4,771	\$10,770
AREA LIGHTS	15.70	146.30
	4594	42873
	\$249	\$2,328
MISC EQUIPMT	100.00	100.00
	29302	29302
	\$1,585	\$1,591
PUMPS & MISC	0.20	0.20
	45	45
	\$2	\$2
SPACE COOL	131.50	274.50
	38539	80428
	\$2,085	\$4,367
VENT FANS	53.60	156.00
	15713	45701
	\$850	\$2,482
NATURAL-GAS(MBtu/therm/\$)	46.80	67.30
)	468	673
	\$234	\$337
SPACE HEAT	46.80	67.30
	468	673
	\$234	\$337

Passing requires Proposed Building cost to be at most 80% of Baseline cost. This Proposed Building is at 45.1%

**PASSES**

Project: RefProj  
 Title: New Project  
 Type: Office  
 (WEA File: FL\_GAINESVILLE\_REGIONAL\_AP.tm3)

### External Lighting Compliance

Description	Category	Tradable?	Allowance (W/Unit)	Area or Length or No. of Units (Sqft or ft)	ELPA (W)	CLP (W)
Ext Light 1	Uncovered Parking Areas -- Parking lots and Drives	Yes	0.15	1,000.0	150	40
Ext Light 2	Internally illuminated exit signs	No	5.00	8.0	40	35
Ext Light 3	Uncovered Parking Areas -- Parking lots and Drives	Yes	0.15			

**Tradable Surfaces: 40 (W) Allowance for Tradable: 159.5 (W)**

**FAILS**

**All External Lighting: 75 (W)**

**Compliance check includes a 5% excess allowance of 9.50(W)**

**Ext Light 3 -- Does not meet control requirements of Type: <2><3>**

Project: RefProj  
 Title: New Project  
 Type: Office  
 (WEA File: FL\_GAINESVILLE\_REGIONAL\_AP.tm3)

### Lighting Controls Compliance

Acronym	Ashrae ID	Description	Area (sq.ft)	Design CP	Min CP	Compli- ance
Pr0Zo1Sp1	14	Classroom/Lecture Hall	10,000	5	4	PASSES

**PASSES**

<b>Project: RefProj</b> <b>Title: New Project</b> <b>Type: Office</b> <b>(WEA File: FL_GAINESVILLE_REGIONAL_AP.tm3)</b>							
<b>System Report Compliance</b>							
<b>Pr0Sy2</b>	<b>System 2</b>	<b>Constant Volume Packaged System</b>				<b>No. of Units</b>	
							<b>1</b>
<b>Component</b>	<b>Category</b>	<b>Capacity</b>	<b>Design Eff</b>	<b>Eff Criteria</b>	<b>Design IPLV</b>	<b>IPLV Criteria</b>	<b>Compliance</b>
Cooling System	Air Conditioners Air Cooled 240000 to 760000 Btu/h Cooling Capacity		15.00	9.30		9.50	<b>FAILS</b>
Heating System	Warm Air Gas Furnace >= 225000 Btu/h		95.00	80.00			<b>PASSES</b>
Air Handling System -Supply	Air Handler (Supply) - Constant Volume		0.50	0.90			<b>PASSES</b>
<b>FAILS</b>							

<b>Plant Compliance</b>								
<b>Description</b>	<b>Installed No</b>	<b>Size</b>	<b>Design Eff</b>	<b>Min Eff</b>	<b>Design IPLV</b>	<b>Min IPLV</b>	<b>Category</b>	<b>Compliance</b>
								<b>None</b>

<b>Project: RefProj</b> <b>Title: New Project</b> <b>Type: Office</b> <b>(WEA File: FL_GAINESVILLE_REGIONAL_AP.tm3)</b>								
<b>Water Heater Compliance</b>								
<b>Description</b>	<b>Type</b>	<b>Category</b>	<b>Design Eff</b>	<b>Min Eff</b>	<b>Design Loss</b>	<b>Max Loss</b>	<b>Compliance</b>	
Water Heater 2	Electric water heater	<= 12 [kW]		0.93			<b>FAILS</b>	
Water Heater 3	Electric water heater	<= 12 [kW]		0.93			<b>FAILS</b>	
<b>FAILS</b>								

**Project: RefProj**  
**Title: New Project**  
**Type: Office**  
**(WEA File: FL\_GAINESVILLE\_REGIONAL\_AP.tm3)**

### Piping System Compliance

Category	Pipe Dia [inches]	Is Runout?	Operating Temp [F]	Ins Cond [Btu-in/hr .SF.F]	Ins Thick [in]	Req Ins Thick [in]	Compliance
Heating System (Steam, Steam Condensate, & Hot Water)	0.25	False	105.00	0.28	0.00	0.50	<b>FAILS</b>

**FAILS**



**Project: RefProj**  
**Title: New Project**  
**Type: Office**  
**(WEA File: FL\_GAINESVILLE\_REGIONAL\_AP.tm3)**

### Other Required Compliance

Category	Section	Requirement (write N/A in box if not applicable)	Check
Report	506.4.2	Input Report Print-Out from EnergyGauge FlaCom attached	<input type="checkbox"/>
Operations Manual	303.3.1, 503.2.9.3, 505.7.4.2	Operations manual provided to owner	<input type="checkbox"/>
Windows & Doors	502.3.2	Glazed swinging entrance & revolving doors: max. 1.0 cfm/ft <sup>2</sup> ; all other products: 0.3 cfm/ft <sup>2</sup>	<input type="checkbox"/>
Joints/Cracks	502.3.3	To be caulked, gasketed, weather-stripped or otherwise sealed	<input type="checkbox"/>
Dropped Ceiling Cavity	502.3	Vented: seal & insulated ceiling. Unvented seal & insulate roof & side walls	<input type="checkbox"/>
HVAC Efficiency	503.2.3	Minimum efficiencies: Tables 503.2.3(1)-(8)	<input type="checkbox"/>
HVAC Controls	503.2.4	Zone controls prevent reheat (exceptions); separate thermostatic control per zone;	<input type="checkbox"/>
Ventilation	503.2.5	Outdoor air supply & exhaust ducts shall have dampers that automatically shut when systems or spaces served are not in use. Exhaust air energy recovery required for cooling systems (Exceptions).	<input type="checkbox"/>
ADS	503.2.7.5	Duct sizing and Design have been performed	<input type="checkbox"/>
HVAC Ducts	503.2.7	Air ducts, fittings, mechanical equipment & plenum chambers shall be mechanically attached, sealed, insulated & installed per Table 503.2.7.2. Fan power limitations.	<input type="checkbox"/>
Balancing	503.2.9.1	HVAC distribution system(s) tested & balanced. Report in construction documents.	<input type="checkbox"/>
Piping Insulation	503.2.8	HAC and service hot water. In accordance with Table 503.2.8.	<input type="checkbox"/>
Water Heaters	504	Performance requirements in accordance with Table 504.2. Heat trap required.	<input type="checkbox"/>
Swimming Pools	504.7	Vapor-retardant or liquid cover or other means proven to reduce heat loss on heated pools; Time switch (exceptions); readily accessible on/off switch.	<input type="checkbox"/>
Motors	505.7.5	Motor efficiency criteria have been met	<input type="checkbox"/>
Lighting Controls	505.2, 502.3	Automatic control required for interior lighting in buildings >5,000 s.f.; Space control; Exterior photo sensor; Tandem wiring with 1 or 3 linear fluorescent lamps>30W	<input type="checkbox"/>

**\*\* Software Title and Version Here \*\***

Section 506.4 Compliant Software. Effective Date: March 15, 2012

# Florida Energy Efficiency Code For Building Construction

\*\* Software Title and Version Here \*\* , Effective Date: March 15, 2012 -- Form 506-2010  
Prescriptive Compliance for Renovations, Occupancy Change, etc.

## PROJECT SUMMARY

**Short Desc:** RefProj

**Description:** New Project

**Owner:** Enter Owner's name here

**Address1:** 1234 Any Street

**City:** Anywhere

**Address2:** Enter Address here

**State:** FL

**Zip:** 12345

**Type:** Office

**Class:** Renovation to existing buildi

**Jurisdiction:** ALACHUA COUNTY, ALACHUA COUNTY, FL (111000)

**Conditioned Area:** 10000 SF

**Conditioned & UnConditioned Area:** 10000 SF

**No of Stories:** 1

**Area entered from Plans** 0 SF

**Permit No:** 0

**Max Tonnage** 50

**If different, write in:** \_\_\_\_\_

## Compliance Summary

<b>Component</b>	<b>Design</b>	<b>Criteria</b>	<b>Result</b>
RENOVATED ENVELOPE PRESCRIPTIVE			<b>FAILS</b>
LIGHTING POWER	1,500.0	14,000.0	<b>PASSES</b>
LIGHTING CONTROLS			<b>PASSES</b>
EXTERNAL LIGHTING			<b>FAILS</b>
HVAC SYSTEM			<b>FAILS</b>
PLANT			<b>None Entered</b>
WATER HEATING SYSTEMS			<b>FAILS</b>
PIPING SYSTEMS			<b>FAILS</b>
Met all required compliance from Check List?			<b>Yes/No/NA</b>

### IMPORTANT MESSAGE

Info 5009 -- -- -- An input report of this design building must be submitted along with this Compliance Report

## CERTIFICATIONS

I hereby certify that the plans and specifications covered by this calculation are in compliance with the Florida Energy Code

Prepared By: John Doe

Building Official: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

I certify that this building is in compliance with the FLorida Energy Efficiency Code

Owner Agent: \_\_\_\_\_

Date: \_\_\_\_\_

If Required by Florida law, I hereby certify (\*) that the system design is in compliance with the Florida Energy Efficiency Code

Architect: \_\_\_\_\_

Reg No: \_\_\_\_\_

Electrical Designer: \_\_\_\_\_

Reg No: \_\_\_\_\_

Lighting Designer: \_\_\_\_\_

Reg No: \_\_\_\_\_

Mechanical Designer: \_\_\_\_\_

Reg No: \_\_\_\_\_

Plumbing Designer: \_\_\_\_\_

Reg No: \_\_\_\_\_

(\*) Signature is required where Florida Law requires design to be performed by registered design professionals.

Project: RefProj  
 Title: New Project  
 Type: Office  
 (WEA File: FL\_GAINESVILLE\_REGIONAL\_AP.tm3)

### Prescriptive Envelope Compliance

Item	Zone	Description	Design	Criteria Meet Req.
Glass	Pr0Zo1	Percent glass Max allowed	16.000	50.000 Yes
Pr0Zo1Wa1	Pr0Zo1	Exterior Wall: UValue Max allowed	.025	0.032 Yes
Pr0Zo1Wa1	Pr0Zo1	Exterior Wall: Absorptance Max allowed	.200	0.300 Yes
Pr0Zo1Wa1Wi	Pr0Zo1Wa1	Exterior Window: SHGC Max allowed	.200	0.190 No
Pr0Zo1Wa1Wi	Pr0Zo1Wa1	Exterior Window: UValue Max allowed	2.000	0.450 No
Pr0Zo1Wa1Wi	Pr0Zo1	Exterior Window: Projection Factor - Minimum Required	.000	0.500 No
Pr0Zo1Wa2	Pr0Zo1	Exterior Wall: UValue Max allowed	.025	0.032 Yes
Pr0Zo1Wa2	Pr0Zo1	Exterior Wall: Absorptance Max allowed	.200	0.300 Yes
Pr0Zo1Wa2Wi	Pr0Zo1Wa2	Exterior Window: SHGC Max allowed	.200	0.190 No
Pr0Zo1Wa2Wi	Pr0Zo1Wa2	Exterior Window: UValue Max allowed	2.000	0.450 No
Pr0Zo1Wa2Wi	Pr0Zo1	Exterior Window: Projection Factor - Minimum Required	.000	0.500 No
Pr0Zo1Wa3	Pr0Zo1	Exterior Wall: UValue Max allowed	.025	0.032 Yes
Pr0Zo1Wa3	Pr0Zo1	Exterior Wall: Absorptance Max allowed	.200	0.300 Yes
Pr0Zo1Wa3Wi	Pr0Zo1Wa3	Exterior Window: SHGC Max allowed	.390	0.190 No
Pr0Zo1Wa3Wi	Pr0Zo1Wa3	Exterior Window: UValue Max allowed	.670	0.450 No
Pr0Zo1Wa3Wi	Pr0Zo1	Exterior Window: Projection Factor - Minimum Required	.000	0.500 No
Pr0Zo1Wa4	Pr0Zo1	Exterior Wall: UValue Max allowed	.025	0.032 Yes
Pr0Zo1Wa4	Pr0Zo1	Exterior Wall: Absorptance Max allowed	.200	0.300 Yes
Pr0Zo1Wa4Wi	Pr0Zo1Wa4	Exterior Window: SHGC Max allowed	.390	0.190 No
Pr0Zo1Wa4Wi	Pr0Zo1Wa4	Exterior Window: UValue Max allowed	.670	0.450 No
Pr0Zo1Wa4Wi	Pr0Zo1	Exterior Window: Projection Factor - Minimum Required	.000	0.500 No
Skylights	Pr0Zo1	Percent Skylight Max allowed	1.000	5.000 Yes
Pr0Zo1Rf1	Pr0Zo1	Exterior Roof UValue Max allowed	.026	0.025 No
Pr0Zo1Rf1	Pr0Zo1	Exterior Roof: Absorptance Max allowed	.200	0.220 Yes
Pr0Zo1Rf1Sk1	Pr0Zo1Rf1	Skylight: SHGC Max allowed	.490	0.190 No
Pr0Zo1Rf1Sk1	Pr0Zo1Rf1Sk1	Skylight: UValue Max allowed	.690	1.360 Yes

**DOES NOT meet Shell Envelope Requirements -- FAILS**

\*\* Software Title and Version Here \*\*

Section 506.4 Compliant Software. Effective Date: March 15, 2012

Project: RefProj  
 Title: New Project  
 Type: Office  
 (WEA File: FL\_GAINESVILLE\_REGIONAL\_AP.tm3)

### External Lighting Compliance

Description	Category	Tradable?	Allowance (W/Unit)	Area or Length or No. of Units (Sqft or ft)	ELPA (W)	CLP (W)
Ext Light 1	Uncovered Parking Areas -- Parking lots and Drives	Yes	0.15	1,000.0	150	40
Ext Light 2	Internally illuminated exit signs	No	5.00	8.0	40	35
Ext Light 3	Uncovered Parking Areas -- Parking lots and Drives	Yes	0.15			

Tradable Surfaces: 40 (W) Allowance for Tradable: 159.5 (W)

**FAILS**

All External Lighting: 75 (W)

Compliance check includes a 5% excess allowance of 9.50(W)

Ext Light 3 -- Does not meet control requirements of Type: <2><3>

Project: RefProj  
 Title: New Project  
 Type: Office  
 (WEA File: FL\_GAINESVILLE\_REGIONAL\_AP.tm3)

### Lighting Power Compliance

Space	Ashrae ID	Description	Area (sq.ft)	Height (ft)	No. of Spaces	Design (W)	Effective (W)	Allowance (W)
Pr0Zo1Sp1	14	Classroom/Lecture Hall	10,000	10.0	1	1500	1500	14,000

Design : 1500 (W)

Effective: 1500 (W)

Allowance: 14000 (W)

Passing requires Design to be at most 100% of Criteria

**PASSES**

Project: RefProj  
 Title: New Project  
 Type: Office  
 (WEA File: FL\_GAINESVILLE\_REGIONAL\_AP.tm3)

### Lighting Controls Compliance

Acronym	Ashrae ID	Description	Area (sq.ft)	Design CP	Min CP	Compliance
Pr0Zo1Sp1	14	Classroom/Lecture Hall	10,000	5	4	PASSES

**PASSES**



**Project: RefProj**  
**Title: New Project**  
**Type: Office**  
**(WEA File: FL\_GAINESVILLE\_REGIONAL\_AP.tm3)**

### Piping System Compliance

Category	Pipe Dia [inches]	Is Runout?	Operating Temp [F]	Ins Cond [Btu-in/hr .SF.F]	Ins Thick [in]	Req Ins Thick [in]	Compliance
Heating System (Steam, Steam Condensate, & Hot Water)	0.25	False	105.00	0.28	0.00	0.50	<b>FAILS</b>

**FAILS**



**Project: RefProj**  
**Title: New Project**  
**Type: Office**  
**(WEA File: FL\_GAINESVILLE\_REGIONAL\_AP.tm3)**

### Other Required Compliance

Category	Section	Requirement (write N/A in box if not applicable)	Check
Report	506.4.2	Input Report Print-Out from EnergyGauge FlaCom attached	<input type="checkbox"/>
Operations Manual	303.3.1, 503.2.9.3, 505.7.4.2	Operations manual provided to owner	<input type="checkbox"/>
Windows & Doors	502.3.2	Glazed swinging entrance & revolving doors: max. 1.0 cfm/ft <sup>2</sup> ; all other products: 0.3 cfm/ft <sup>2</sup>	<input type="checkbox"/>
Joints/Cracks	502.3.3	To be caulked, gasketed, weather-stripped or otherwise sealed	<input type="checkbox"/>
Dropped Ceiling Cavity	502.3	Vented: seal & insulated ceiling. Unvented seal & insulate roof & side walls	<input type="checkbox"/>
HVAC Efficiency	503.2.3	Minimum efficiencies: Tables 503.2.3(1)-(8)	<input type="checkbox"/>
HVAC Controls	503.2.4	Zone controls prevent reheat (exceptions); separate thermostatic control per zone;	<input type="checkbox"/>
Ventilation	503.2.5	Outdoor air supply & exhaust ducts shall have dampers that automatically shut when systems or spaces served are not in use. Exhaust air energy recovery required for cooling systems (Exceptions).	<input type="checkbox"/>
ADS	503.2.7.5	Duct sizing and Design have been performed	<input type="checkbox"/>
HVAC Ducts	503.2.7	Air ducts, fittings, mechanical equipment & plenum chambers shall be mechanically attached, sealed, insulated & installed per Table 503.2.7.2. Fan power limitations.	<input type="checkbox"/>
Balancing	503.2.9.1	HVAC distribution system(s) tested & balanced. Report in construction documents.	<input type="checkbox"/>
Piping Insulation	503.2.8	HAC and service hot water. In accordance with Table 503.2.8.	<input type="checkbox"/>
Water Heaters	504	Performance requirements in accordance with Table 504.2. Heat trap required.	<input type="checkbox"/>
Swimming Pools	504.7	Vapor-retardant or liquid cover or other means proven to reduce heat loss on heated pools; Time switch (exceptions); readily accessible on/off switch.	<input type="checkbox"/>
Motors	505.7.5	Motor efficiency criteria have been met	<input type="checkbox"/>
Lighting Controls	505.2, 502.3	Automatic control required for interior lighting in buildings >5,000 s.f.; Space control; Exterior photo sensor; Tandem wiring with 1 or 3 linear fluorescent lamps>30W	<input type="checkbox"/>

# Florida Energy Efficiency Code For Building Construction

\*\* Software Title and Version Here \*\* , Effective Date: March 15, 2012 -- Form 506-2010  
Prescriptive Envelope Compliance for Shell Buildings

## PROJECT SUMMARY

**Short Desc:** RefProj

**Description:** New Project

**Owner:** Enter Owner's name here

**Address1:** 1234 Any Street

**City:** Anywhere

**Address2:** Enter Address here

**State:** FL

**Zip:** 12345

**Type:** Office

**Class:** New Shell building

**Jurisdiction:** ALACHUA COUNTY, ALACHUA COUNTY, FL (111000)

**Conditioned Area:** 10000 SF

**Conditioned & UnConditioned Area:** 10000 SF

**No of Stories:** 1

**Area entered from Plans** 0 SF

**Permit No:** 0

**Max Tonnage** 50

**If different, write in:** \_\_\_\_\_

## Compliance Summary

Component	Design	Criteria	Result
SHELL ENVELOPE PRESCRIPTIVE			<b>FAILS</b>
Met all required compliance from Check List?			<b>Yes/No/NA</b>
<p><b>IMPORTANT MESSAGE</b> Info 5009 -- -- -- An input report of this design building must be submitted along with this Compliance Report</p>			

## CERTIFICATIONS

I hereby certify that the plans and specifications covered by this calculation are in compliance with the Florida Energy Code

Prepared By: John Doe

Building Official: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

I certify that this building is in compliance with the FLorida Energy Efficiency Code

Owner Agent: \_\_\_\_\_

Date: \_\_\_\_\_

If Required by Florida law, I hereby certify (\*) that the system design is in compliance with the Florida Energy Efficiency Code

Architect: \_\_\_\_\_

Reg No: \_\_\_\_\_

Electrical Designer: \_\_\_\_\_

Reg No: \_\_\_\_\_

Lighting Designer: \_\_\_\_\_

Reg No: \_\_\_\_\_

Mechanical Designer: \_\_\_\_\_

Reg No: \_\_\_\_\_

Plumbing Designer: \_\_\_\_\_

Reg No: \_\_\_\_\_

(\*) Signature is required where Florida Law requires design to be performed by registered design professionals.

Project: RefProj  
 Title: New Project  
 Type: Office  
 (WEA File: FL\_GAINESVILLE\_REGIONAL\_AP.tm3)

### Prescriptive Envelope Compliance

Item	Zone	Description	Design	Criteria Meet Req.
Glass	Pr0Zo1	Percent glass Max allowed	16.000	50.000 Yes
Pr0Zo1Wa1	Pr0Zo1	Exterior Wall: UValue Max allowed	.025	0.032 Yes
Pr0Zo1Wa1	Pr0Zo1	Exterior Wall: Absorptance Max allowed	.200	0.300 Yes
Pr0Zo1Wa1Wi	Pr0Zo1Wa1	Exterior Window: SHGC Max allowed	.200	0.190 No
Pr0Zo1Wa1Wi	Pr0Zo1Wa1	Exterior Window: UValue Max allowed	2.000	0.450 No
Pr0Zo1Wa1Wi	Pr0Zo1	Exterior Window: Projection Factor - Minimum Required	.000	0.500 No
Pr0Zo1Wa2	Pr0Zo1	Exterior Wall: UValue Max allowed	.025	0.032 Yes
Pr0Zo1Wa2	Pr0Zo1	Exterior Wall: Absorptance Max allowed	.200	0.300 Yes
Pr0Zo1Wa2Wi	Pr0Zo1Wa2	Exterior Window: SHGC Max allowed	.200	0.190 No
Pr0Zo1Wa2Wi	Pr0Zo1Wa2	Exterior Window: UValue Max allowed	2.000	0.450 No
Pr0Zo1Wa2Wi	Pr0Zo1	Exterior Window: Projection Factor - Minimum Required	.000	0.500 No
Pr0Zo1Wa3	Pr0Zo1	Exterior Wall: UValue Max allowed	.025	0.032 Yes
Pr0Zo1Wa3	Pr0Zo1	Exterior Wall: Absorptance Max allowed	.200	0.300 Yes
Pr0Zo1Wa3Wi	Pr0Zo1Wa3	Exterior Window: SHGC Max allowed	.390	0.190 No
Pr0Zo1Wa3Wi	Pr0Zo1Wa3	Exterior Window: UValue Max allowed	.670	0.450 No
Pr0Zo1Wa3Wi	Pr0Zo1	Exterior Window: Projection Factor - Minimum Required	.000	0.500 No
Pr0Zo1Wa4	Pr0Zo1	Exterior Wall: UValue Max allowed	.025	0.032 Yes
Pr0Zo1Wa4	Pr0Zo1	Exterior Wall: Absorptance Max allowed	.200	0.300 Yes
Pr0Zo1Wa4Wi	Pr0Zo1Wa4	Exterior Window: SHGC Max allowed	.390	0.190 No
Pr0Zo1Wa4Wi	Pr0Zo1Wa4	Exterior Window: UValue Max allowed	.670	0.450 No
Pr0Zo1Wa4Wi	Pr0Zo1	Exterior Window: Projection Factor - Minimum Required	.000	0.500 No
Skylights	Pr0Zo1	Percent Skylight Max allowed	1.000	5.000 Yes
Pr0Zo1Rf1	Pr0Zo1	Exterior Roof UValue Max allowed	.026	0.025 No
Pr0Zo1Rf1	Pr0Zo1	Exterior Roof: Absorptance Max allowed	.200	0.220 Yes
Pr0Zo1Rf1Sk1	Pr0Zo1Rf1	Skylight: SHGC Max allowed	.490	0.190 No
Pr0Zo1Rf1Sk1	Pr0Zo1Rf1Sk1	Skylight: UValue Max allowed	.690	1.360 Yes

**DOES NOT meet Shell Envelope Requirements -- FAILS**

**Info 5017 -- -- -- Important Warning: Total Building Performance calculation will still be required upon build out of the spaces. It is highly recommended that the shell be built keeping in mind the stringency of the Total Building Performance Compliance Method at the final stage. Running a trial of the Total Building Performance calculation is encouraged.**

## APPENDIX C

### Florida Energy Code Standard Reference Design Auto-Generation Tests

This section contains the Standard Reference Design auto-generation test suite for Florida Energy Code performance compliance tools. The test cases in this proposed test suite are designed to verify that software tools automatically generate accurate Standard Reference Designs given only the building information from the Proposed Design.

#### C.1 Minimum Reporting Requirements

Software tools applying for verification shall provide evidence that their software meets the requirements of this test suite. The software tool provider or software vendor is responsible for producing the documentation needed to show that the software has been verified through this test suite. In some cases, the data needed to verify accuracy is of no interest or value to the end-user of the software, but in any case, the software tool must generate it. At a minimum, software tools applying for accreditation must report the following values for the Standard Reference Design:

1. Areas and overall U-factors (or R-values in the case of slab-on-grade construction) for all building components, including ceilings, walls, floors, windows (by orientation) and doors.
2. Overall solar-heat gain coefficient (SHGC<sub>o</sub>)<sup>1</sup> of the windows during heating.
3. Overall solar-heat gain coefficient (SHGC<sub>o</sub>) of the windows during cooling.
4. Wall solar absorptance and infrared emittance
5. Roof solar absorptance and infrared emittance
6. Total internal gains (including 20% latent) to the home (Btu/day)
7. Specific leakage area (SLA) for the building, by zone or as SLA<sub>o</sub><sup>2</sup>, as appropriate
8. Attic net free ventilation area (ft<sup>2</sup>)
9. Crawlspace net free ventilation area (ft<sup>2</sup>), if appropriate
10. Exposed masonry floor area and carpet and pad R-value, if appropriate
11. Heating system labeled ratings, including AFUE, COP, or HSPF, as appropriate.
12. Cooling system labeled ratings, including SEER or EER, as appropriate.
13. Thermostat schedule for heating and cooling
14. Air distribution system characteristics, including locations of all supply and return ducts and the air handler units, supply and return duct R-values, and supply and return duct air leakage values (in cfm<sub>25</sub>).<sup>3</sup>
15. Mechanical ventilation kWh/yr., if appropriate

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<sup>1</sup> The overall solar heat gain coefficient (SHGC<sub>o</sub>) of a fenestration is defined as the solar heat gain coefficient (SHGC) of the fenestration product taken in combination with the interior shade fraction for the fenestration.

<sup>2</sup> SLA<sub>o</sub> is the floor-area weighted specific leakage area of a home where the different building zones (e.g. basement and living zones) have different specific leakage areas.

<sup>3</sup> cfm<sub>25</sub> = cubic feet per minute of air leakage to outdoors at a pressure difference between the duct interior and outdoors of 25 Pa.

Software tools must have the ability to recreate or store the test case Standard Reference Designs as if they were Proposed Design such that they also can be simulated and evaluated as the Proposed Design.

### C.2 Auto-generation Test Case Descriptions

Test Case 1. HERS BESTEST case L100 building configured as specified in the HERS BESTEST procedures, located in Tallahassee, FL, including a total of 3 bedrooms and the following mechanical equipment: gas furnace with AFUE = 82% and central air conditioning with SEER = 11.0.

Test Case 2. HERS BESTEST case L100 configured on an un-vented crawlspace with R-7 crawlspace wall insulation, located in Orlando, FL, including a total of 3 bedrooms and the following mechanical equipment: electric heat pump with HSPF = 7.5 and SEER = 12.0.

Test Case 3. HERS BESTEST case L304 in Miami, configured as specified in the HERS BESTEST procedures, located in Miami, FL, including a total of 2 bedrooms and the following mechanical equipment: electric strip heating with COP = 1.0 and central air conditioner with SEER = 15.0.

Test Case 4. HERS BESTEST case L324 configured as specified as in the HERS BESTEST procedures, located in Jacksonville, FL, including a total of 4 bedrooms and the following mechanical equipment: gas furnace with AFUE = 95% and no air conditioning.

Test Case 5. Recreate or store the Standard Reference Design created in Tests 1 through 4 as Proposed Design and simulate and evaluate them.

### C.3 Acceptance Criteria

#### C.3.1 Test Cases 1 – 4.

For test cases 1 through 4 the values contained in Table C.3.1 shall be used as the acceptance criteria for software tool accreditation. For Standard Reference Design building components marked by an asterisk (\*), the acceptance criteria may include a range equal to  $\pm 0.05\%$  of the listed value. For all other Standard Reference Design components the listed values are exact.

**Table C.3.1 Acceptance Criteria for Test Cases 1 – 4**

Standard Reference Design Building Component	Test 1	Test 2	Test 3	Test 4
Above-grade walls ( $U_o$ )	0.082	0.082	0.082	0.082
Above-grade wall solar absorptance ( $\alpha$ )	0.75	0.75	0.75	0.75
Above-grade wall infrared emittance ( $\epsilon$ )	0.90	0.90	0.90	0.90

<b>Standard Reference Design Building Component</b>	<b>Test 1</b>	<b>Test 2</b>	<b>Test 3</b>	<b>Test 4</b>
Basement walls ( $U_o$ )	n/a	n/a	n/a	0.36
Above-grade floors ( $U_o$ )	0.064	0.064	n/a	n/a
Slab insulation R-Value	n/a	n/a	0	0
Ceilings ( $U_o$ )	0.030	0.035	0.035	0.035
Roof solar absorptance ( $\alpha$ )	0.75	0.75	0.75	0.75
Roof infrared emittance ( $\epsilon$ )	0.90	0.90	0.90	0.90
Attic vent area* (ft <sup>2</sup> )	5.13	5.13	5.13	5.13
Crawlspace vent area* (ft <sup>2</sup> )	n/a	10.26	n/a	n/a
Exposed masonry floor area* (ft <sup>2</sup> )	n/a	n/a	307.8	307.8
Carpet & Pad R-Value	n/a	n/a	2.0	2.0
Door Area (ft <sup>2</sup> )	40	40	40	40
Door U-Factor	0.75	0.75	0.75	0.75
North window area* (ft <sup>2</sup> )	69.26	69.26	69.26	102.63
South window area* (ft <sup>2</sup> )	69.26	69.26	69.26	102.63
East window area* (ft <sup>2</sup> )	69.26	69.26	69.26	102.63
West window area* (ft <sup>2</sup> )	69.26	69.26	69.26	102.63
Window U-Factor	0.75	0.75	0.75	0.75
Window SHGC <sub>o</sub> (heating)	0.34	0.34	0.34	0.34
Window SHGC <sub>o</sub> (cooling)	0.28	0.28	0.28	0.28
SLA <sub>o</sub> (ft <sup>2</sup> /ft <sup>2</sup> )	0.00036	0.00036	0.00036	0.00036
Internal gains* (Btu/day)	71,167	71,167	62,605	103,014
Labeled heating system efficiency rating	AFUE = 78%	HSPF = 7.7	HSPF = 7.7	AFUE = 78%
Labeled cooling system efficiency rating	SEER = 13.0	SEER = 13.0	SEER = 13.0	SEER = 13.0



<b>Standard Reference Design Building Component</b>	<b>Test 1</b>	<b>Test 2</b>	<b>Test 3</b>	<b>Test 4</b>
Air Distribution System Efficiency	0.80	0.80	0.80	0.80
Thermostat Type	Manual	Manual	Manual	Manual
Heating thermostat settings	68 F (all hours)	68 F (all hours)	68 F (all hours)	68 F (all hours)
Cooling thermostat settings	78 F (all hours)	78 F (all hours)	78 F (all hours)	78 F (all hours)

C.3.2 Test Case 5.

Test case 5 requires that each of the Standard Reference Design for test cases 1-4 be stored or recreated in the software tool as Proposed Design and simulated as any other Proposed Design would be simulated. If the resulting Proposed Design is correctly configured to be identical to its appropriate Standard Reference Design, code compliance calculations arising from normal operation of the software tool should produce virtually identical scoring criteria for both the Standard Reference Design and the Proposed Design for this round of tests. For test case 5, the e-Ratio shall be calculated separately using the simulation results for heating, cooling, hot water and the other provisions of Section B-1.1.3 of the Florida Energy Code as follows:

$$\text{e-Ratio} = (\text{Proposed Design normalized modified loads}) / (\text{Standard Reference Design loads})$$

Acceptance criteria for these calculations shall be  $\pm 0.5\%$  of 1.00. Thus, for each of the preceding test cases (1-4), the e-Ratio resulting from these software tool simulations and the subsequent e-Ratio calculations shall be greater than or equal to 0.995 and less than or equal to 1.005.