Energy

Proposed Code Modifications

This document created by the Florida Department of Community Affairs - 850-487-1824

TAC: Energy

Sub Code: Energy Conservation

Total Mods for Energy: 37

EN3714

Date Submitted	3/23/2010	**Section**	202	**Proponent**	Ann Stanton
Chapter	2	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation Approved as Modified
Commission Action Pending Review

Related Modifications

Summary of Modification

Add definitions for Absorptance, Multi-Scene Control and Normative.

Rationale

Adds definitions that clarify terms used in the code whose meaning is not readily apparent.
Absorptance: Table 502.1.1.1
Multi-Scene Control: Sec. 505.2.1.1
Normative: Sections 405.4.1, 506.4, Appendix B

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

Makes code clearer.

Impact to building and property owners relative to cost of compliance with code

None.

Impact to industry relative to the cost of compliance with code

None.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Yes. Clarifies code.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Yes.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

No.

Does not degrade the effectiveness of the code

No.

ABSORPTANCE. The ratio of the total ~~un~~absorbed radiation to the total incident radiation; equal to 1 (unity) minus the transmittance.

MULTI-SCENE CONTROL. A lighting control device or system that allows for two or more pre-defined lighting settings, in addition to all off, for two or more groups of luminaires to suit multiple activities in the space, and allows the automatic recall of those settings.

NORMATIVE. Made an integral part of a standard or code.

EN3714-G1

Proponent Arlene Stewart **Submitted** 10/18/2010 **Attachments** No

Comment:

TAC Action should be overturned as this language is not in the IECC and no Florida-specific climate related justification was included with the original submission. Concept and language should be submitted to the IECC as part of the ICC code development process.

ABSORPTANCE. The ratio of the total unabsorbed radiation to the total incident radiation; equal to 1 (unity) minus the transmittance.

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NORMATIVE. Made an integral part of a standard or code.

EN4197

Date Submitted	3/31/2010	**Section**	403.2.1	**Proponent**	Robert Volin
Chapter	4	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation Approved as Modified
Commission Action Pending Review

Related Modifications

503.2.7.5

Summary of Modification

Needs to be in residential code because Manual D applies to Residential and Light commercial duct systems

Rationale

It is already in our energy code now Section 13-610.AB.1

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

None

Impact to building and property owners relative to cost of compliance with code

Already in code

Impact to industry relative to the cost of compliance with code

If enforced, could save homeowners 20% -30% on energy bills
and save homeowners on costly repair cost on their A/C system

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

None

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Already in Florida Code

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

No

Does not degrade the effectiveness of the code

No

403.2 Ducts.

403.2.1 Insulation (Prescriptive). Supply ducts, including air filter enclosures, air ducts and plenums, located in attics or on roofs shall be insulated to a minimum of R-8. All other ducts shall be insulated to a minimum of R-6.

Exceptions:

1. Ducts or portions thereof located completely inside the building thermal envelope.

2. Exhaust air ducts

3. Factory-installed plenums, casings or ductwork furnished as a part of tested and rated HVAC equipment.

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

1. Calculation of the supply air for each room shall be based on the greater of the heating load or sensible cooling load for that room.

2. Duct size shall be determined by the supply air requirements of each room, the available static pressure and the total equivalent length of the various duct runs.

3. Friction loss data shall correspond to the type of material used in duct construction.

2nd Comment Period 09/03/2010 - 10/18/2010

EN4197-G2

Proponent	Arlene Stewart	Submitted	10/18/2010	Attachments	No

Comment:

TAC Action should be overturned as this language is not in the IECC and no Florida-specific climate related justification was included with the original submission. Concept and language should be submitted to the IECC as part of the ICC code development process.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4197-G1

Proponent	Jack Glenn	Submitted	6/1/2010	Attachments	No

Comment:

Requirement is in Mechanical Volume of the code and does not need to be included in the Energy Code.

403.2 Ducts.

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Exceptions:

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2. Duct size shall be determined by the supply air requirements of each room, the available static pressure and the total equivalent length of the various duct runs.

3. Friction loss data shall correspond to the type of material used in duct construction.

EN4457

Date Submitted	4/2/2010	**Section**	405.6	**Proponent**	Jack Glenn
Chapter	4	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation Approved as Modified
Commission Action Pending Review

Related Modifications

Summary of Modification

This modification introduces the option for approved computing software energy compliance

Rationale

This provision gives the Florida Building commission the option to approve additional software tools that can meet the provisions laid out in this appendix. Although Florida has not had yet other tools available, other manufacturers may attempt to meet these computing criteria. As with all other products associated with the code, competition is essential to meet free market requirements.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

No impact on local enforcement.

Impact to building and property owners relative to cost of compliance with code

Provides more options to show compliance

Impact to industry relative to the cost of compliance with code

Potential to reduce cost as market will be more competitive

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

No change

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Improves the code by providing options.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

Does not discriminate

Does not degrade the effectiveness of the code

Does not degrade the code.

See EN4457-R2

B-1.2 ~~405.6~~ Calculation software tools. Only~~The EnergyGauge USA Fla/Res~~ compliance software tools ~~or other software tools as~~ approved by the Florida Building Commission shall be utilized to conform to the provisions of Section 405.

not needed

RESNET
Residential Energy Services Network

Procedures for Verification of RESNET Accredited HERS Software Tools

RESNET Publication No. 06-002

December 2006

Published by:

Residential Energy Services Network, Inc.
P.O. Box 4561
Oceanside, CA 92052-4561
http://resnet.us/

Setting the STANDARD for QUALITY

P. O. Box 4561 • Oceanside, CA 92052-4561 • http://resnet.us

Alternate Language

2nd Comment Period 09/03/2010 - 10/18/2010

EN4457-A3

Proponent Jack Glenn **Submitted** 10/18/2010 **Attachments** Yes

Rationale

Change will provide criteria for the Commission to apprve computer software. The language was taken from the IECC modified to fit the Florida Building code, Energy Conservation.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

No impct on local enforcement

Impact to building and property owners relative to cost of compliance with code

Provides more options to show compliance

Impact to industry relative to the cost of compliance with code

Potential to reduce cost as market will be more competitive

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

No change

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Improves the code by providing options.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

Does not discriminate

Does not degrade the effectiveness of the code

Does not degrade the code

Alternate Language

2nd Comment Period 09/03/2010 - 10/18/2010

EN4457-A1

Proponent Ann Stanton **Submitted** 10/18/2010 **Attachments** Yes

Rationale

Without criteria for establishing whether a computer program is adequate, the Florida Building Commision has no basis to judge whether any program is adequate to demonstrate code compliance. Minimal compliance criteria and standards are proposed.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

Without a standard by which code coompliance is established, there is no way the local code official can determine if a program utilized will meet code.

Impact to building and property owners relative to cost of compliance with code

Without a standard by which computer programs may comply with the code, building owners would have to comply with Section 402.

Impact to industry relative to the cost of compliance with code

Industry would have to build a home with low E glazing and all ducts interior to conditioned space compliant with Section 402.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Yes. Without criteria by which the Commission can determine compliance, the cost of code compliance could be higher than necessary.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Yes, criteria for determining code compliance for computer programs are necessary if any one computer program is not referenced.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

It provides the capability of determining code compliance for various computer programs.

Does not degrade the effectiveness of the code

No, it would determine effectiveness of various computer program options.

B-1.2 ~~405.6~~ Calculation software tools. The EnergyGauge USA Fla/Res compliance software tools or other software tools as approved by the Florida Building Commission shall be utilized to conform to the provisions of Section 405.

B-1.2 ~~405.6~~ Calculation software tools. Only~~The EnergyGauge USA Fla/Res compliance software tools or other software tools as~~approved by the Florida Building Commission shall be utilized to conform to the provisions of Section 405.

B-1.2.1 [No Change]

B-1.2.2 Technical requirements for energy code compliance software programs. Documentaton shall be provided that the software program has passed the BESTEST developed by the National Renewable Energy Laboratory using the criteria and acceptability ranges set forth in the Procedures for Verification of RESNET Accredited HERS Software Tools published by the Residential Energy Services Network and the specifications for the standard reference design and proposed design from Table B-1.1.2(1) of this Normative Appendix. Minimum requirements for code software by the performance methodology include:

1. The software shall perform a simulation that accounts for each hour of the year based on Florida specific historical meteorological data with at least one set of data each for North, Central and South Florida.

2. The software shall automatically calculate the Florida standard reference design and proposed design buildings as specified in Table B-1.1.2(1) of this Normative Appendix such that the user only has to enter the design building.

3. The software shall automatically make the calculations necessary to determine an e-ratio, shall provide a PASS or FAIL grade and shall provide reports consistent with the requirements of Section 405.4.2.

4. A copy of the BESTEST documentation and a file copy of the software shall be maintained by the Commission.

Chapter 6

NREL

National Renewable Energy Laboratory

1617 Cole Boulevard

Golden, CO 880401

NREL/TP-472-7332 HERS BESTEST, Home Energy Rating System Building Energy Simulation Test, Vols. 1 and 2 B-1.2.2

RESNET

Residential Energy Services Network

PO Box 4561

Oceanside, CA 92052-4561

Pubn. #06-002	Procedures for Verification of RESNET Accredited HERS	
December 2006	Software Tools	B-1.2.2

B-1.2 ~~405.6~~ Calculation software tools. Only ~~**The EnergyGauge USA Fla/Res compliance software tools or other software tools**~~ asapproved by the Florida Building Commission shall be utilized to conform to the provisions of Section 405.

B-1.2.1 Calculation software tools to be approved by the Florida Building Commission.

B-1.2.1.1 Minimum capabilities. Calculation procedures used to comply with this section shall be software tools 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. 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 M1401.3 of the Florida Building Code Residential.

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 code official inspection checklist listing each of the proposed design component characteristics from Table 405.5.2(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.).

B-1.2.1.2 Specific approval. Performance analysis tools meeting the applicable sections of Section 405 shall be permitted to be approved. Tools are permitted to be approved based on meeting a specified threshold for a jurisdiction. The code official shall be permitted to approve tools for a specified application or limited scope.

RESNET
Residential Energy Services Network

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RESNET Publication No. 06-002

December 2006

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EN4061

Date Submitted	3/29/2010	**Section**	503	**Proponent**	Mangesh Basarkar
Chapter	5	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation Approved as Modified
Commission Action Pending Review

Related Modifications

Summary of Modification

Modification to reference (baseline) building HVAC equipment suppy and return fan power calculation

Rationale

Contrary to earlier interpretation, the intent of the ASHRAE 90.1 Energy Cost Budget Method (ECBM) code compliance in case of fan power suggests this methodology to be the correct approach.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

Proposed modification will have no impact on enforcement of code

Impact to building and property owners relative to cost of compliance with code

There will be minimal impact to building and property owners relative to cost of code compliance

Impact to industry relative to the cost of compliance with code

There will be no impact to industry relative to cost of code compliance

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Proposed modification has no substantial connection with the health, safety and welfare of the general public

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Proposed modification strengthens the existing code

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

Proposed modification does not discriminate against any materials, products, methods or system of construction

Does not degrade the effectiveness of the code

Proposed modification does not degrade the effectiveness of the code

Table 503.2.10.1(1)

FAN POWER LIMITATION1,2

	Limit Volume	Constant	Variable Volume
Option 1: Fan System Motor Nameplate hp	Allowable nameplate motor hp	Hp = CFMS x 0.0011	Hp = CFMSs x 0.0015
Option 2: Fan System bhp	Allowable fan system bhp	Bhp = CFMS x 0.00094 + A	Bhp = CFMSs x 0.0013 + A

[1] Where:

CFM_S = the maximum design supply airflow rate to conditioned spaces served by the system in cubic feet per minute.

Hp = the maximum combined motor nameplate horsepower

Bhp = the maximum combined fan brake horsepower

A = sum of (PD x CFM_d/4131)

Where:

PD = each applicable pressure drop adjustment from Table 503.2.10.1(1) in in. w.c.

CFM_D = the design airflow through each applicable device from Table 503,2,10.1(2) in cubic feet per minute.

[2] For Section 506 ~~Method A~~, the Standard Reference Design ~~baseline~~ building HVAC system will use the smaller value of the appropriate fan power from table 503.2.10.1(1) or the equivalent proposed (design) building HVAC system fan power for supply and return fans.

2nd Comment Period 09/03/2010 - 10/18/2010

Proponent Arlene Stewart **Submitted** 10/18/2010 **Attachments** No

EN4061-G2

Comment:

TAC Action should be overturned as this language is not in the IECC and no Florida-specific climate related justification was included with the original submission. Concept and language should be submitted to the IECC as part of the ICC code development process.

1st Comment Period History 04/15/2010 - 06/01/2010

Proponent Jack Glenn **Submitted** 6/1/2010 **Attachments** No

EN4061-G1

Comment:

Proponent indicates that is the correct interpretation of 90.1, but does not cite an edition. Is it the version cited in the base IECC that we are integrating? If not, it should wait until the next code cycle as part of that base code. Also, what is the basis for changing the interpretation?

Proposal:

A modification to the reference building HVAC system supply and return fan power calculation when using Method A (whole building simulation) for Florida Energy Code compliance is proposed. The current code always uses the prescriptive value from Table 503.2.10.1(1) for fan power of the reference (baseline) building HVAC system regardless of the values used for the design (proposed) building HVAC system. It is proposed that this be modified to use the smaller of the fan power value from Table 503.2.10.1(1) or the equivalent design building HVAC system fan power value.

This modification can be reflected in the code in the form of foot note '2' to be added to table 503.2.10.1(1) as shown below.

Table 503.2.10.1(1)
FAN POWER LIMITATION[1,2]

	Limit	Constant Volume	Variable Volume
Option 1: Fan System Motor Nameplate hp	Allowable nameplate motor hp	Hp = CFM_S x 0.0011	Hp = CFM_{Ss} x 0.0015
Option 2: Fan System bhp	Allowable fan system bhp	Bhp = CFM_S x 0.00094 + A	Bhp = CFM_{Ss} x 0.0013 + A

[1] Where:

CFM_S = the maximum design supply airflow rate to conditioned spaces served by the system in cubic feet per minute.

Hp = the maximum combined motor nameplate horsepower

Bhp = the maximum combined fan brake horsepower

A = sum of (PD x CFM_d/4131)

Where:

PD = each applicable pressure drop adjustment from Table 503.2.10.1(1) in in. w.c.

CFM_D = the design airflow through each applicable device from Table 503,2,10.1(2) in cubic feet per minute.

[2] For Method A, the baseline building HVAC system will use the smaller value of the appropriate fan power from table 503.2.10.1(1) or the equivalent proposed (design) building HVAC system fan power for supply and return fans

[Table ok as is]

[2] For Section 506 ~~Method A~~, the Standard Reference Design ~~baseline~~ building HVAC system will use the smaller value of the appropriate fan power from table 503.2.10.1(1) or the equivalent proposed (design) building HVAC system fan power for supply and return fans

EN4467

Date Submitted	4/2/2010	**Section**	505.6	**Proponent**	Jack Glenn
Chapter	5	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation Approved as Modified
Commission Action Pending Review

Related Modifications

Summary of Modification

This modification introduces the option for approved computing software energy compliance

Rationale

This provision gives the Florida Building commission the option to approve additional software tools that can meet the provisions laid out in this appendix. Although Florida has not had yet other tools available, other manufacturers may attempt to meet these computing criteria. As with all other products associated with the code, competition is essential to meet free market requirements.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

No impact on local enforcement.

Impact to building and property owners relative to cost of compliance with code

Provides more options to show compliance

Impact to industry relative to the cost of compliance with code

Potential to reduce cost as market will be more competitive

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

No change

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Improves the code by providing options.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

Does not discriminate

Does not degrade the effectiveness of the code

Does not degrade the code.

B-2.3 ~~**506.6**~~ **Calculation software tools.** Calculation procedures used to comply with this section shall be **Only**~~**The EnergyGauge USA-Fla/Res compliance software tools or other software tools as**~~

~~**those included in the EnergyGauge Summit Fla/Com or other software tools as**~~ approved by the Florida Building Commission ~~**software**~~

Alternate Language

2nd Comment Period 09/03/2010 - 10/18/2010

EN4467-A6

Proponent Jack Glenn **Submitted** 10/18/2010 **Attachments** Yes

Rationale

Provide the Commission with criteria for the selection od computer software

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

No impact on local enforcement

Impact to building and property owners relative to cost of compliance with code

Provides more options to show compliance

Impact to industry relative to the cost of compliance with code

Potential to reduce cost as market will be more competitive

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

No change

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Provides option that are approved by the Commission that should reduce the cost of compliance.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

Does not discriminate

Does not degrade the effectiveness of the code

Does degrade the effectiveness of the code

Alternate Language

2nd Comment Period 09/03/2010 - 10/18/2010

EN4467-A4

Proponent Ann Stanton **Submitted** 10/18/2010 **Attachments** Yes

Rationale

Without criteria for ascertaining whether a computer program is acceptable, the Commission has no assurance that code compliance is achieved. This comment provides criteria for determining whether a computer program can be used to meet code for commercial buildings.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

Without an approved computer program, the code contains no way to determine if a building complies with the code.

Impact to building and property owners relative to cost of compliance with code

There is no way to comply with the code for commercial buildings without an approved computer program.

Impact to industry relative to the cost of compliance with code

Code compliance cannot be determined without the Commission approving at least one computer program for use with commercial buildings.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Yes. Energy code compliance cannot be determined without an approved computer program for commercial buildings as the code is currently written.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Yes. Would provide a way to demonstrate code compliance.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

No. It would provide a tool for determining code compliance.

Does not degrade the effectiveness of the code

Not unless such rules are not adopted.

B-2.3 ~~506.6~~ Calculation software tools. Calculation procedures used to comply with this section shall be those included in the EnergyGauge Summit Fla/Com or other software tools as approved by the Florida Building Commission software

B-2.3 Calculation software tools. Calculation procedures used to comply with this section shall be those included in ~~the EnergyGauge Summit Fla/Com or other~~ software tools as approved by the Florida Building Commission in 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: [No change to 1 - 9]

B-2.3.1 Technical requirements for energy code compliance software programs. Documentaton shall be provided that the software program has passed ASHRAE Standard 140, Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs (ANSI Approved), using the criteria and acceptability ranges set forth in that document and the specifications for the standard reference design and proposed design from Table B-2.2 of this Normative Appendix as set forth in Chapter 11 of ASHRAE 90.1. Minimum requirements for code software by the performance methodology include:

1. The software shall perform a simulation that accounts for each hour of the year based on Florida specific historical meteorological data with at least one set of data each for North, Central and South Florida.

2. The software shall automatically calculate the Florida standard reference design and proposed design buildings as specified in Table B-2.2 of this Normative Appendix such that the user only has to enter the design building. Any specification of the standard reference design building not provided in Florida's code shall follow the rules provided in Appendix G of ASHRAE 90.1.

3. The software shall automatically calculate the Florida standard reference design and proposed design buildings as specified in Table B-2.2 of this Normative Appendix such that the user only has to enter the design building. Any specification of the standard reference design building not provided in Florida's code shall follow the rules provided in Appendix G of ASHRAE 90.1.

4. The software shall automatically make the calculations necessary to determine code compliance, shall provide a PASS or FAIL grade and shall provide reports consistent with the requirements of Section 506.4.

5. A copy of the ASHRAE 140 documentation and a file copy of the software shall be maintained by the Commission.

Chapter 6

ASHRAE

ANSI/ASHRAE 140-2007 Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs B-2.3.1

B-2.3 Calculation software tools. Calculation procedures used to comply with this section shall be those included in ~~the EnergyGauge Summit Fla/Com or other~~ software tools as approved by the Florida Building Commission in 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: [No change to 1 - 9]

B-2.3.1 Calculation software tools to be approved by the Florida Building Commission.

B-2.3.1.1 Calculation software tools. Calculation procedures used to comply with this section shall be software tools 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.

EN4077

Date Submitted	4/1/2010	**Section**	FL Std 3	**Proponent**	Jennifer Hatfield
Chapter	10	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation Approved as Modified
Commission Action Pending Review

Related Modifications

Summary of Modification

Provides criteria on how to comply w/ s. 403.9.5 of the FECC; the mandatory requirement for portable spas, per legislative directive. This document is the APSP-14 draft Standard for Portable Spa Energy Efficiency that provides the test protocol manufacturers must use when determining standby power.

Rationale

This proposal provides criteria to the manufacturers of portable spas & contractors who install these products on what is required to meet the standby power requirement in s. 403.9.5 of the FECC & the 2008 energy bill. A permit may be required when installing a portable spa & the criteria includes labeling requirements to assist inspectors. The legislation & s. 403.9.5 references the portable spa test protocol, by adopting FL-3, the test protocol can be easily referenced.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

It may take extra time for the AHJ to verify the portable spa being installed meets this new energy efficiency requirement.

Impact to building and property owners relative to cost of compliance with code

This energy efficient product may possibly increase the cost of the product to the owner upfront; however, a savings will ultimately occur with the owner's utility bill that should offset any increase associated with purchasing the product.

Impact to industry relative to the cost of compliance with code

This same requirement is in affect in other states and may soon be a federal law; thefefore, the impact to the industry has already occured for those who have complied.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Portable spas meeting this energy efficient requirement will result in lower energy consumption, benefiting the general public.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

This proposal strengthens and improves the code by requiring portable spas' standby power not be greater than 5(V2/3) watts where V = the total volume, in gallons, when spas are measured in accordance with the spa industry test protocol provided in FL-3, Appendix D, resulting in energy savings.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

This proposal provides for a test procedure for all products to adhere to, products not meeting these new requirements will not be allowed to be installed.

Does not degrade the effectiveness of the code

This proposal does not degrade the effectiveness of the code; it actually strengthens and gives consistency throughout the State of Florida by providing guidance on how to meet the new energy efficiency requirements for portable spas.

APPENDIX D—FLORIDA STANDARDS

FLORIDA STANDARD NO. 3 (FL-3)

FLORIDA REGULATORY REQUIREMENTS FOR PORTABLE SPA ENERGY EFFICIENCY

The following regulatory requirements shall constitute Florida Standard FL-3 and provide compliance criteria for section 403.9.5 of the Florida Building Code, Energy Conservation Code. These requirements follow a draft national standard for portable spa energy efficiency.

Section 1. Scope

1.1 These requirements apply to factory built residential portable spas that are used for bathing and are operated by an owner.

1.2 This standard is meant to establish minimum energy efficiency requirements for spas. This standard shall be met notwithstanding certain variations in equipment, materials, and design (Refer to ANSI/NSPI-6).

1.3 These requirements do not apply to public spas, permanently installed residential spas or other spas, such as those operated for medical treatment, physical therapy or other purposes. Swim-spas and portions of combination spas/swim-spas are included in this standard.

1.4 Other standards are referenced in this standard for items not covered.

Section 2. Normative reference

APSP-6 Standard for Portable Spas[1]

Section 3. Definitions

AMBIENT TEMPERATURE – Air temperature inside testing chamber.

ANCILLARY EQUIPMENT – Additional components used in the construction of the spa beyond pumps, heaters and control systems.

CHAMBER – Climate controlled test room.

ENERGY EFFICIENCY – Using less energy to provide the same level of energy service.

FILL VOLUME - The halfway point between the bottom of the skimmer opening and the top of the spa. If there is no wall skimmer, the spa shall be filled with water to six inches below the top of the spa.

FILTER CYCLE - The period when the control system activates a pump intended to move water through a filter media.

GALLON – Means U.S. liquid gallon

HEATING CYCLE – The period when the temperature regulating system activates the heating component for the purpose of increasing the water temperature.

HOT TUB – See Spa

INGROUND SPA - Non-portable, non-self-contained spa (Refer to ANSI -3 Permanent Inground Spas)

NORMALIZE – Calculation of power consumption to eliminate temperature bias.

NRTL – Nationally Recognized Test Laboratory

POWER FACTOR – The ratio of watts to volt-amperes of an AC circuit.

PURGE CYCLE - The period when the control system activates a pump intended to rapidly move water throughout the spa.

SKIMMER – A suction opening intended to remove floating debris from the water surface and to be installed where part of the water intake opening is open to atmospheric pressure.

SPA – A product intended for the immersion of persons in heated water circulated in a closed system, and not intended to be drained and filled with each use. A spa usually includes a filter, a heater (electric, solar, or gas), a pump or pumps, and a control, and may also include other equipment, such as lights, blowers, and water sanitizing equipment.

Permanent Residential Spa- A spa in which the water heating and water circulating equipment is not an integral part of the product. The spa shall be intended as a permanent plumbing fixture and shall not be intended to be moved. (Refer to ANSI/NSPI-3 1999 Standard For Permanently Installed Residential Spas.)

Public Spa - Any spa other than a permanent residential spa or residential portable spa which is intended to be used for bathing and is operated by an owner, licensee, concessionaire, regardless of whether a fee is charged for use. (Refer to ANSI/NSPI-2 1999 Standard for Public Spas.)

Residential Portable Spa - Either Self-Contained or Non-Self-Contained (Refer to ANSI/NSPI-6 1999 Standard For Residential Portable Spas.):

Self Contained Spa - A factory built spa in which all control, water heating and water circulating equipment is an integral part of the product. Self-contained spas may be permanently wired or cord connected.

Non-Self-Contained Spa - A factory built spa in which the water heating and circulating equipment is not an integral part of the product. Non-self-contained spas may employ separate components such as an individual filter, pump, heater and controls, or they may employ assembled combinations of various components.

STANDARD COVER – The cover that is provided or specified by the spa manufacturer.

STANDBY MODE - All settings at default as shipped by the manufacturer, except water temperature which may be adjusted to meet the test conditions. No manual operations are enabled.

~~SWIMSPA - Variant of a Residential Portable Spa which consists of a large unobstructed volume of water primarily designed for, and constructed with specific equipment required to produce a water flow intended to allow recreational physical activity including, but not limited to, swimming in place.~~

~~Swim spas may include peripheral jetted seats intended for water therapy, heater, circulation and filtration system, or may be a separate distinct portion of a combination spa/swim spa with separate controls.~~

SWIM SPA - Variant of a factory built residential portable spa which consists of a large unobstructed volume of water that allows the 99% male/female to swim utilizing swim jets for a treadmill-like workout, primarily designed for, and constructed with specific equipment required to produce a water flow intended to allow recreational physical activity including, but not limited to, swimming in place. Swim spas may include peripheral jetted seats intended for water therapy, heater, circulation and filtration system, or may be a separate distinct portion of a combination spa/swim spa with separate controls.

WATT HOUR – Energy consumed over a period of one hour.

Section 4. Test Method

4.1 Purpose: To measure the energy consumption of a portable electric spa in standby mode, using a repeatable and reproducible test procedure. The results will be used to calculate the standby power demand.

4.2 Test Equipment

Note: All equipment shall be calibrated and traceable to the National Institute of Standards and Technology (NIST). The test facility and equipment will be evaluated by a NRTL to confirm they meet the requirements of this standard. Documentation showing facility and test equipment compliance to this standard from the NRTL will be maintained on site by the test facility and made available as required.

4.2.1 Recording Watt Hour meter – Accuracy: Class-2 or better.

4.2.2 Temperature measurement system - Accuracy: +/- 1°F

4.2.3 Water meter to measure fill water in gallons – Accuracy: +/- 1.5%

4.3 Test Conditions

The test method for portable electric spas is as follows:

4.3.1 Minimum continuous testing time shall be 72 hours.

4.3.2 The spa shall be filled with water to the halfway point between the bottom of the skimmer opening and the top of the spa. If there is no wall skimmer, the spa shall be filled with water to six inches below the top of the spa.

4.3.2.1 Measure and record fill volume (V) while filling according to 4.3.2.

4.3.3 The water temperature of the spa or spa portion of a combination swim spa shall be a minimum of 100°F, for the duration of the test. The water temperature of the swim spa or swim portion of a combination swim spa shall be a minimum of 85°F, for the duration of the test.

4.3.4 The ambient air temperature shall be a maximum of 63°F for the duration of the test.

4.3.5 The standard cover that comes with the unit shall be used during the test.

4.4 Test Procedure

4.4.1 The test shall start when the water temperature has been at 102°F, ±2°F, (at 87°F, ± 2°F for swimspas) for at least a four hour stabilizing period.

4.4.2 Record water temperature.

4.4.2.1 The thermocouple shall be located three to five inches below the water level and centrally located relative to the shape of the spa.

4.4.3 Record ambient air temperature at one point located a maximum of one to one and a half feet above spa cover level and six to eight inches from the chamber wall and out of direct airflow from the chamber temperature control system and/or circulation fan.

4.4.4 Data Recording

4.4.4.1 Record temperatures at a maximum interval of 4 minutes.

4.4.4.2 Measure voltage, current, and power factor (OPTIONAL) at a maximum interval of 4 minutes.

4.4.4.3 Record watt-hours, voltage and current used during entire Test Period.

4.4.4.4 Record elapsed time during Test Record.

4.4.5 Record the total energy use for the period of test, starting at the end of the first heating cycle after the stabilization period and finishing at the end of the first heating cycle after 72 hours has elapsed.

Exception: For spas without heaters, substitute heating cycle with filter or purge cycle.

4.4.6 The unit shall remain covered and in the default operation mode during the test. Energy-conserving circulation functions, if present, must not be enabled if not appropriate for continuous, long-term use. The minimum filtration rate shall be 12 water turns within a 24 hour period. Ancillary equipment including, but not limited to lights, audio systems, and water treatment devices, shall remain connected to the mains but may be turned off during the test if their controls are user accessible.

Section 5. Formulas

5.1 The measured standby power (Pmeas) shall be determined by E/t:

Pmeas = E/t

Where:

E = total energy use during the test (Wh)

t = length of test (hr)

5.2 The measured standby power (Pmeas) shall be normalized (P_{norm}) to a temperature difference of 37°F using the equation:

P_{norm} = Pmeas (Delta Tideal / Delta Tmeas)

Where:

Delta Tideal = 37°F

Delta Tmeas = Twater avg – Tair avg

Twater avg = Average water temperature during test

Tair avg = Average air temperature during test.

5.3 The normalized standby power (Pnorm) shall not be greater than maximum standby power (Pmax):

$Pmax = 5(V^{2/3})$

Where:

V = fill volume in gallons

Section 6. Label Requirements

6.1 The manufacturer shall include either on or in close proximity to the spa's product label the standby watts rating.

6.2 Wording to be in the following format:

Per ANSI-14 Measured Standby Power Consumption XXXX watts/hr

(Maximum Allowable Standby Power Consumption XXXX watts/hr)

APPENDIX A

Minimum Chamber Requirements

Chamber internal dimensions:

Minimum 7 feet high

Minimum 1 foot from spa to chamber wall or other internal barrier.

Air flow: If air circulation from the air temperature control equipment is intermittent, install 1 fan in one corner of the chamber, 6 feet from the floor. Direct toward the center of the floor. The fan should move at least 80 CFM of air, and not more than 100 CFM. If the air temperature control equipment continuously circulates air in the chamber, no fan is required.

Chamber Insulation: Walls shall be insulated adequately to maintain proper ambient temperatures.

Chamber Floor: The floor may be insulated with 2" thick R-13 polisocyanurate with radiant barrier on both sides. This insulation shall be laid directly on a level concrete floor or slab or other firm, level surface created for it. The insulating layer shall be sheeted with minimum 1/2" thick plywood to protect the insulation layer and provide a smooth surface to properly position the spas to be tested.

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[1] Association of Pool & Spa Professionals (APSP) (formerly National Spa and Pool Institute (NSPI), 2111 Eisenhower Avenue, Alexandria, VA 22314

Alternate Language

2nd Comment Period 09/03/2010 - 10/18/2010

EN4077-A2

Proponent Jennifer Hatfield **Submitted** 10/18/2010 **Attachments** Yes

Rationale

This comment updates the FL-3 standard with the most recent version of the APSP-14 Portable Spa Energy Efficient Standard, which is currently out for canvas. This ensures what is in FL-3 is the most up to date version. To view the changes review the attached file above which provides them in tracked changes.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

It may take extra time for the AHJ to verify the portable spa being installed meets this new energy efficiency requirements.

Impact to building and property owners relative to cost of compliance with code

May possible increase the cost of teh product to the owner upfront; however, a savings will ulimately occur in the utility bill.

Impact to industry relative to the cost of compliance with code

These requirements are already in affect in other states and are currently in the works to become a federal requirement - most of the impact has already occured to the portable spa industry.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Benefits the general public with improved energy efficiency.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Improves and strengthens the code and provides the direction needed to comply with the state law requiring this efficiency.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

Does not discriminate.

Does not degrade the effectiveness of the code

Does not degrade the effectiveness of the code.

Alternate Language

1st Comment Period History 04/15/2010 - 06/01/2010

EN4077-A1

Proponent Jennifer Hatfield **Submitted** 6/1/2010 **Attachments** Yes

Rationale

This section is part of a larger proposal. Regarding this part of the proposed mod, the definition of Swim Spa has been revised by the ANSI/APSP-14 portable spa drafting committee and the revised definition clarifies the differences between a swim spa from a pool or a therapy spa, avoiding any confusion.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

None

Impact to building and property owners relative to cost of compliance with code

None

Impact to industry relative to the cost of compliance with code

None

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

None

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Provides for clarification that could result in confusion.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

No

Does not degrade the effectiveness of the code

No

APPENDIX D—FLORIDA STANDARDS

FLORIDA STANDARD NO. 3 (FL-3)

FLORIDA REGULATORY REQUIREMENTS FOR PORTABLE SPA ENERGY EFFICIENCY

The following regulatory requirements shall constitute Florida Standard FL-3 and provide compliance criteria for section 403.9.5 of the Florida Building Code, Energy Conservation Code. These requirements follow a draft national standard for portable spa energy efficiency.

Section 1. Scope

1.1 These requirements apply to factory built residential portable spas that are used for bathing and are operated by an owner.

1.2 This standard is meant to establish minimum energy efficiency requirements for spas. This standard shall be met notwithstanding certain variations in equipment, materials, and design (Refer to ANSI/NSPI-6).

1.3 These requirements do not apply to public spas, permanently installed residential spas or other spas, such as those operated for medical treatment, physical therapy or other purposes. Swim-spas and portions of combination spas/swim-spas are included in this standard.

1.4 Other standards are referenced in this standard for items not covered.

Section 2. Normative reference

APSP-6 Standard for Portable Spas[1]

Section 3. Definitions

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ANCILLARY EQUIPMENT – Additional components used in the construction of the spa beyond pumps, heaters and control systems.

CHAMBER – Climate controlled test room.

ENERGY EFFICIENCY – Using less energy to provide the same level of energy service.

FILL VOLUME - The halfway point between the bottom of the skimmer opening and the top of the spa. If there is no wall skimmer, the spa shall be filled with water to six inches below the top of the spa.

FILTER CYCLE - The period when the control system activates a pump intended to move water through a filter media.

GALLON – Means U.S. liquid gallon

HEATING CYCLE – The period when the temperature regulating system activates the heating component for the purpose of increasing the water temperature.

HOT TUB – See Spa

INGROUND SPA - Non-portable, non-self-contained spa (Refer to ANSI -3 Permanent Inground Spas)

NORMALIZE – Calculation of power consumption to eliminate temperature bias.

NRTL – Nationally Recognized Test Laboratory

POWER FACTOR – The ratio of watts to volt-amperes of an AC circuit.

PURGE CYCLE - The period when the control system activates a pump intended to rapidly move water throughout the spa.

SKIMMER – A suction opening intended to remove floating debris from the water surface and to be installed where part of the water intake opening is open to atmospheric pressure.

SPA – A product intended for the immersion of persons in heated water circulated in a closed system, and not intended to be drained and filled with each use. A spa usually includes a filter, a heater (electric, solar, or gas), a pump or pumps, and a control, and may also include other equipment, such as lights, blowers, and water sanitizing equipment.

> Permanent Residential Spa- A spa in which the water heating and water circulating equipment is not an integral part of the product. The spa shall be intended as a permanent plumbing fixture and shall not be intended to be moved. (Refer to ANSI/NSPI-3 1999 Standard For Permanently Installed Residential Spas.)
>
> Public Spa - Any spa other than a permanent residential spa or residential portable spa which is intended to be used for bathing and is operated by an owner, licensee, concessionaire, regardless of whether a fee is charged for use. (Refer to ANSI/NSPI-2 1999 Standard for Public Spas.)
>
> Residential Portable Spa - Either Self-Contained or Non-Self-Contained (Refer to ANSI/NSPI-6 1999 Standard For Residential Portable Spas.):
>
> > Self Contained Spa - A factory built spa in which all control, water heating and water circulating equipment is an integral part of the product. Self-contained spas may be permanently wired or cord connected.
> >
> > Non-Self-Contained Spa - A factory built spa in which the water heating and circulating equipment is not an integral part of the product. Non-self-contained spas may employ separate components such as an individual filter, pump, heater and controls, or they may employ assembled combinations of various components.

STANDARD COVER – The cover that is provided or specified by the spa manufacturer.

STANDBY MODE - All settings at default as shipped by the manufacturer, except water temperature which may be adjusted to meet the test conditions. No manual operations are enabled.

SWIMSPA –Variant of a Residential Portable Spa which consists of a large unobstructed volume of water primarily designed for, and constructed with specific equipment required to produce a water flow intended to allow recreational physical activity including, but not limited to, swimming in place.

> Swim spas may include peripheral jetted seats intended for water therapy, heater, circulation and filtration system, or may be a separate distinct portion of a combination spa/swim spa with separate controls.

WATT HOUR – Energy consumed over a period of one hour.

Section 4. Test Method

4.1 Purpose: To measure the energy consumption of a portable electric spa in standby mode, using a repeatable and reproducible test procedure. The results will be used to calculate the standby power demand.

4.2 Test Equipment

Note: All equipment shall be calibrated and traceable to the National Institute of Standards and Technology (NIST). The test facility and equipment will be evaluated by a NRTL to confirm they meet the requirements of this standard. Documentation showing facility and test equipment compliance to this standard from the NRTL will be maintained on site by the test facility and made available as required.

4.2.1 Recording Watt Hour meter – Accuracy: Class-2 or better.

4.2.2 Temperature measurement system - Accuracy: +/- 1°F

4.2.3 Water meter to measure fill water in gallons – Accuracy: +/- 1.5%

4.3 Test Conditions

The test method for portable electric spas is as follows:

4.3.1 Minimum continuous testing time shall be 72 hours.

4.3.2 The spa shall be filled with water to the halfway point between the bottom of the skimmer opening and the top of the spa. If there is no wall skimmer, the spa shall be filled with water to six inches below the top of the spa.

4.3.2.1 Measure and record fill volume (V) while filling according to 4.3.2.

4.3.3 The water temperature of the spa or spa portion of a combination swim spa shall be a minimum of 100°F, for the duration of the test. The water temperature of the swim spa or swim portion of a combination swim spa shall be a minimum of 85°F, for the duration of the test.

4.3.4 The ambient air temperature shall be a maximum of 63°F for the duration of the test.

4.3.5 The standard cover that comes with the unit shall be used during the test.

4.4 Test Procedure

4.4.1 The test shall start when the water temperature has been at 102°F, ±2°F, (at 87°F, ± 2°F for swimspas) for at least a four hour stabilizing period.

4.4.2 Record water temperature.

4.4.2.1 The thermocouple shall be located three to five inches below the water level and centrally located relative to the shape of the spa.

4.4.3 Record ambient air temperature at one point located a maximum of one to one and a half feet above spa cover level and six to eight inches from the chamber wall and out of direct airflow from the chamber temperature control system and/or circulation fan.

4.4.4 Data Recording

4.4.4.1 Record temperatures at a maximum interval of 4 minutes.

4.4.4.2 Measure voltage, current, and power factor (OPTIONAL) at a maximum interval of 4 minutes.

4.4.4.3 Record watt-hours, voltage and current used during entire Test Period.

4.4.4.4 Record elapsed time during Test Record.

4.4.5 Record the total energy use for the period of test, starting at the end of the first heating cycle after the stabilization period and finishing at the end of the first heating cycle after 72 hours has elapsed.

Exception: For spas without heaters, substitute heating cycle with filter or purge cycle.

4.4.6 The unit shall remain covered and in the default operation mode during the test. Energy-conserving circulation functions, if present, must not be enabled if not appropriate for continuous, long-term use. The minimum filtration rate shall be 12 water turns within a 24 hour period. Ancillary equipment including, but not limited to lights, audio systems, and water treatment devices, shall remain connected to the mains but may be turned off during the test if their controls are user accessible.

Section 5. Formulas

5.1 The measured standby power (Pmeas) shall be determined by E/t:

Pmeas = E/t

Where:

E = total energy use during the test (Wh)

t = length of test (hr)

5.2 The measured standby power (Pmeas) shall be normalized (P_{norm}) to a temperature difference of 37°F using the equation:

P_{norm} = Pmeas (Delta Tideal / Delta Tmeas)

Where:

Delta Tideal = 37°F

Delta Tmeas = Twater avg – Tair avg

Twater avg = Average water temperature during test

Tair avg = Average air temperature during test.

5.3 The normalized standby power (Pnorm) shall not be greater than maximum standby power (Pmax):

$Pmax = 5(V^{2/3})$

Where:

V = fill volume in gallons

Section 6. Label Requirements

6.1 The manufacturer shall include either on or in close proximity to the spa's product label the standby watts rating.

6.2 Wording to be in the following format:

Per ANSI-14 Measured Standby Power Consumption XXXX watts/hr

(Maximum Allowable Standby Power Consumption XXXX watts/hr)

APPENDIX A

Minimum Chamber Requirements

Chamber internal dimensions:

Minimum 7 feet high

Minimum 1 foot from spa to chamber wall or other internal barrier.

Air flow: If air circulation from the air temperature control equipment is intermittent, install 1 fan in one corner of the chamber, 6 feet from the floor. Direct toward the center of the floor. The fan should move at least 80 CFM of air, and not more than 100 CFM. If the air temperature control equipment continuously circulates air in the chamber, no fan is required.

Chamber Insulation: Walls shall be insulated adequately to maintain proper ambient temperatures.

Chamber Floor: The floor may be insulated with 2" thick R-13 polisocyanurate with radiant barrier on both sides. This insulation shall be laid directly on a level concrete floor or slab or other firm, level surface created for it. The insulating layer shall be sheeted with minimum 1/2" thick plywood to protect the insulation layer and provide a smooth surface to properly position the spas to be tested.

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[1] Association of Pool & Spa Professionals (APSP) (formerly National Spa and Pool Institute (NSPI), 2111 Eisenhower Avenue, Alexandria, VA 22314

Proposed Appendix D - Florida Standard No. 3 (FL-3), Florida Regulatory Requirements for Portable Spa Energy Efficiency Section 3 Definitions: Delete the definition of Swim Spa and replace it with the following:

~~SWIMSPA - Variant of a Residential Portable Spa which consists of a large unobstructed volume of water primarily designed for, and constructed with specific equipment required to produce a water flow intended to allow recreational physical activity including, but not limited to, swimming in place.~~

~~Swim spas may include peripheral jetted seats intended for water therapy, heater, circulation and filtration system, or may be a separate distinct portion of a combination spa/swim spa with separate controls.~~

SWIM SPA - Variant of a factory built residential portable spa which consists of a large unobstructed volume of water that allows the 99% male/female to swim utilizing swim jets for a treadmill-like workout, primarily designed for, and constructed with specific equipment required to produce a water flow intended to allow recreational physical activity including, but not limited to, swimming in place. Swim spas may include peripheral jetted seats intended for water therapy, heater, circulation and filtration system, or may be a separate distinct portion of a combination spa/swim spa with separate controls.

APPENDIX D—FLORIDA STANDARDS

FLORIDA STANDARD NO. 3 (FL-3)

FLORIDA REGULATORY REQUIREMENTS FOR PORTABLE ELECTRIC SPA ENERGY EFFICIENCY

The following regulatory requirements shall constitute Florida Standard FL-3 and provide compliance criteria for section 403.9.5 of the *Florida Building Code, Energy Conservation Code.* These requirements follow an Association of Pool & Spa Professional (APSP)national standard for portable electric spa energy efficiency that is currently obtaining ANSI approval.

SECTION 1

SCOPE

1.1 These requirements apply to factory built residential portable electric spas that are used for bathing and are operated by a private owner.

1.2 This standard is meant to establish minimum energy efficiency requirements for portable electric spas. This standard shall be met notwithstanding certain variations in equipment, materials, and design (Refer to ANSI/NSPI-6).

1.3 These requirements do not apply to public spas, permanently installed spas or other spas, such as those operated for medical treatment, physical therapy or other purposes. Swim-spas and portions of combination spas/swim-spas are included in this standard.

1.4 Other standards are referenced in this standard for items not covered.

SECTION 2

NORMATIVE REFERENCES

APSP-6 Standard for Portable Spas[1]

ISO/IEC 17025 General Requirements for the Competence of Calibration and Testing Laboratories

ISO/IEC Guide 65 General Requirements for Bodies Operating Product Certification Systems

SECTION 3

DEFINITIONS

AMBIENT TEMPERATURE – Air temperature inside testing chamber.

ANCILLARY EQUIPMENT – Additional components used in the construction of the spa beyond pumps, heaters and control systems.

CERTIFICATION BODY (CB) – An independent third party that operates a product, process or service certification system.

CHAMBER – A controlled environment suitable for conducting energy efficiency testing.

COVER, SPECIFIED – The cover that is provided or specified by the spa manufacturer.

ENERGY EFFICIENCY STANDARD – A performance standard expressed in numerical form, such as energy factor, EER, or thermal efficiency.

FILL VOLUME - The halfway point between the bottom of the skimmer opening and the overflow level of the spa. In the absence of a wall skimmer, the fill volume is six inches below the overflow level of the spa.

FILTER CYCLE - The period when the control system activates a pump intended to move water through a filter media.

GALLON – Means U.S. liquid gallon

HEATING CYCLE – The period when the temperature regulating system activates the heating component for the purpose of increasing the water temperature.

HOT TUB – See Spa

INGROUND SPA - Non-portable, non-self-contained spa (Refer to ANSI/NSPI-3 Permanent Inground Spas)

NORMALIZE – Calculation of power consumption to eliminate temperature bias.

POWER FACTOR – The ratio of watts to volt-amperes of an AC circuit.

PURGE CYCLE - The period when the control system activates a pump intended to rapidly move water throughout the spa.

SKIMMER, VENTED – A suction opening intended to remove floating debris from the water surface and to be installed where part of the water intake opening is open to atmospheric pressure.

SPA – A product intended for the immersion of persons in heated water circulated in a closed system, and not intended to be drained and filled with each use. A spa usually includes a filter, a heater (electric, solar, or gas), a pump or pumps, and a control, and may also include other equipment, such as lights, blowers, and water sanitizing equipment.

Permanent Residential Spa- A spa in which the water heating and water circulating equipment is not an integral part of the product. The spa shall be intended as a permanent plumbing fixture and shall not be intended to be moved. (Refer to ANSI/NSPI-3 1999 Standard For Permanently Installed Residential Spas.)

Public Spa - Any spa other than a permanent residential spa or residential portable spa which is intended to be used for bathing and is operated by an owner, licensee, concessionaire, regardless of whether a fee is charged for use. (Refer to ANSI/NSPI-2 1999 Standard for Public Spas.)

Residential Portable Spa - Either Self-Contained or Non-Self-Contained (Refer to ANSI/NSPI-6 1999 Standard For Residential Portable Spas.):

Self Contained Spa - A factory built spa in which all control, water heating and water circulating equipment is an integral part of the product. Self-contained spas may be permanently wired or cord connected.

Non-Self-Contained Spa - A factory built spa in which the water heating and circulating equipment is not an integral part of the product. Non-self-contained spas may employ separate components such as an individual filter, pump, heater and controls, or they may employ assembled combinations of various components.

STANDBY MODE - All settings at default as shipped by the manufacturer, except water temperature which may be adjusted to meet the test conditions. No manual operations are enabled.

SWIMSPA –Variant of a factory built residential portable spa consisting of a large unobstructed volume of water that allows the 99% male population to swim. The design and construction of a swim spa includes specific features and equipment to produce a water flow intended to allow recreational physical activity including, but not limited to, swimming in place.

Swim spas may include peripheral jetted seats intended for water therapy, heater, circulation and filtration system, or may be a separate distinct portion of a combination spa/swim spa and may have separate controls.

SECTION 4

QUALIFICATION OF TESTING LABORATORIES AND CERTIFICATION BODIES

4.1 All Certification Bodies (CBs) shall be accredited by a member of IAF (International Accreditation Forum) using ISO/IEC Guide 65, General Requirements for Bodies Operating Product Certification Systems.

4.2 All testing laboratories shall be qualified by.a CB

4.2.1 The CB shall assess the testing laboratory's quality system to determine that it satisfies applicable requirements of ISO/IEC 17025.

NOTE: Different parts of ISO/IEC 17025 are applicable to first-party, second-party and third-party laboratories.

4.2.2 Where a laboratory is accredited to ISO/IEC 17025 by a member of ILAC (International Laboratory Accreditation Council) the CB is permitted to accept such accreditation as evidence of conformity to ISO/IEC 17025, in whole or in part.

4.2.3 The CB shall additionally assess the laboratory's facilities, test equipment, testing personnel and test procedures, to establish that the laboratory is competent to perform the tests in this standard.

4.2.4 The CB shall provide a copy of the assessment report to the testing laboratory, and retain a record of the assessment. Any discrepancies identified in the assessment report shall be cleared before the laboratory is deemed qualified.

4.3 Testing laboratories shall demonstrate qualification on a continuing basis.

4.3.1 The CB shall audit the testing laboratory for ISO/IEC 17025 compliance and testing competence on a regular basis.

4.3.1.1 Laboratories accredited by an ILAC member shall be audited at intervals not exceeding three (3) years.

4.3.1.2 Non-accredited laboratories shall be audited annually by the CB.

4.3.2 The CB shall provide a copy of the audit report to the testing laboratory, and retain a record of the audit. Any discrepancies identified in the audit report shall be cleared before the laboratory is deemed re-qualified.

SECTION 5

TEST METHOD

5.1 Purpose: To measure the energy consumption of a portable electric spa in standby mode, using a repeatable and reproducible test procedure. The results will be used to calculate the standby power demand.

5.2 The test facility and equipment will be audited as indicated in 4.3 of this standard to confirm they meet the requirements of this standard. Documentation showing facility and test equipment compliance to this standard from the CB will be maintained on side by the test facility and made available as required. (See Appendix B)

5.3 All eipment shall be calibrated at intervals not to exceed eighteen months, and traceable to NIST or other national standard.

5.4. Test Equipment

5.4.1 Recording Watt Hour meter – Accuracy: Class-2 or better.

5.4.2. Temperature measurement system - Accuracy: +/- 1°F

5.4..3 Water meter to measure fill water in gallons – Accuracy: +/- 1.5%

5.5 Test Conditions

The test method for portable electric spas is as follows:

5.5.1 Minimum continuous testing time shall be 72 hours.

45.5.2 The spa shall be filled with water to the halfway point between the bottom of the skimmer opening and the top of the spa. In the absence of a wall skimmer, the fill volume is six inches below the overflow level of the spa.

5.5.2.1 Measure and record fill volume (V).

5.5.3 The water temperature of the spa or spa portion of a combination swim spa shall be a minimum of 100°F, for the duration of the test. The water temperature of the swim spa or swim portion of a combination swim spa shall be a minimum of 85°F, for the duration of the test.

5.5.4 The ambient air temperature shall be a maximum of 63°F for the duration of the test.

5.5.5 The manufacturer's specified cover shall be used during the test.

5.6 Test Procedure

5.6.1 The test shall start when the water temperature has been at 102°F, ± 2°F, (at 87°F, ± 2°F for Swim spas) for at least a four hour stabilizing period.

5.6.2 Record water temperature.

5.6.2.1 The thermocouple shall be located three to five inches below the water level and centrally located relative to the shape of the spa.

5.6.3 Record ambient air temperature at one point located twelve to eighteen inches above spa cover level and six to eight inches from the chamber wall. The temperature probe will be positioned and out of direct airflow from the circulation fan.

5.6.4 Data Recording

5.6.4.1 Record temperatures at a maximum interval of 5 minutes.

5.6.4.2 Measure voltage, current, and power factor (OPTIONAL) at a maximum interval of 5 minutes.

.5.6.4.3 Record watt-hours, voltage and current used during entire Test Period.

5.6.4.4 Record elapsed time during Test Record.

5.6.5 Record the total energy use for the period of test, starting at the end of the first heating cycle after the stabilization period and finishing at the end of the first heating cycle after 72 hours has elapsed.

Exception: For spas without heaters, substitute heating cycle with filter or purge cycle.

5.6.6 The unit shall remain covered and in the default operation mode during the test. Energy-conserving circulation functions, if present, must not be enabled if not appropriate for continuous, long-term use. The minimum filtration rate shall be 12 water turns within a 24 hour period. Ancillary equipment including, but not limited to lights, audio systems, and water treatment devices, shall remain connected to the mains but may be turned off during the test if their controls are user accessible.

SECTION 6

FORMULAS

6.1 The measured standby power (Pmeas) shall be determined by E/t:

Pmeas = E/t

Where:

E = total energy use during the test (Wh)

t = length of test (hr)

6.2 The measured standby power (Pmeas) shall be normalized (P_{norm}) to a temperature difference of 37°F using the equation:

P_{norm} = Pmeas (?Tideal / ?Tmeas)

Where:

?Tideal = 37°F

?Tmeas = Twater avg – Tair avg

Twater avg = Average water temperature during test

Tair avg = Average air temperature during test.

6.3 The normalized standby power (Pnorm) shall not be greater than maximum standby power (Pmax):

Pmax = $5(V^{2/3})$

Where:

V = fill volume in gallons

SECTION 7

LABEL REQIREMENTS

7.1 The manufacturer shall include either on or in close proximity to the spa's product label the standby watts rating.

7.2 Wording to be in the following format:

Per ANSI-14 Measured Standby Power Consumption XXXX Watts (Maximum Allowable Standby Power Consumption XXXX Watts)

APPENDIX A (Informative)

This appendix is not part of the American National Standard and is included for information only.

Minimum Chamber Requirements

Chamber internal dimensions:

Minimum 7 feet high

Minimum 1 foot from spa to chamber wall or other internal barrier.

Air flow: If air circulation from the air temperature control equipment is intermittent, install 1 fan in one corner of the chamber, 6 feet from the floor. Direct toward the center of the floor. The fan should move at least 80 CFM of air, and not more than 100 CFM. If the air temperature control equipment continuously circulates air in the chamber, no fan is required.

Chamber Insulation: Walls shall be insulated adequately to maintain proper ambient temperatures.

Chamber Floor: The floor may be insulated with 2" thick R-13 polisocyanurate with radiant barrier on both sides. This insulation shall be laid directly on a level concrete floor or slab or other firm, level surface created for it. The insulating layer shall be sheeted with minimum 1/2" thick plywood to protect the insulation layer and provide a smooth surface to properly position the spas to be tested.

APPENDIX B (Informative)

This appendix is not part of the American National Standard and is included for information only.

Procedure for Establishing Test Facility and Equipment Compliance

This section provides an evaluation procedure to qualify a test facility for the sole purpose of testing to the requirements outlined in **ANSI/APSP 14 Portable Spa Energy Efficiency Standard.**

All evaluations are to be conducted by a CB as defined in Section 3 of this standard.

Any testing performed, data and results obtained, or facility and equipment used prior to the adoption of ANSI/APSP 14 is exempt from the requirements of Appendix B.

1. Test Chamber

1.1 The test chamber will be evaluated to establish compliance with the construction requirements outlined in Appendix A.

1.2 The test chamber must demonstrate the capability to maintain the test environment(s) called for in Section 4 of this standard.

1.2.1 The test chamber will be evaluated operating at the test parameters for a minimum of three hours.

2- Data Measuring and Recording Equipment

2.1. The operator of the test facility will provide proof of calibration traceable to NIST or other national standard for all equipment used to measure and collect data as outlined in Section 4 of this standard.

2.2 The maximum period before equipment recalibration is required will be eighteen months from its previous calibration date.

2.2.1 If the test equipment comes from the manufacturer with a Certificate of Calibration, the time frame for recalibration will be a maximum of eighteen months from date of purchase.

2.3 Calibration records (electronic or hard copy), will be kept by the test facility and made available upon request by the evaluating CB.

3- Training of Personnel

3.1 The test facility will designate the person, and alternates, responsible for training other employees in the requirements of performing the ANSI 14 Portable Spa Energy Efficiency Testing.

3.1.1 Training records will include:

The person(s) doing the training

Date(s) the training took place

Facility and chamber used

3.2 The test facility will keep employee training records and provide them to the CB upon request.

4- Record Maintenance

4.1 Upon request of the CB, the test facility will provide a copy of all forms used, (electronic or hard copy), to record the required test data.

4.2 The CB may review previous testing performed for compliance to this standard.

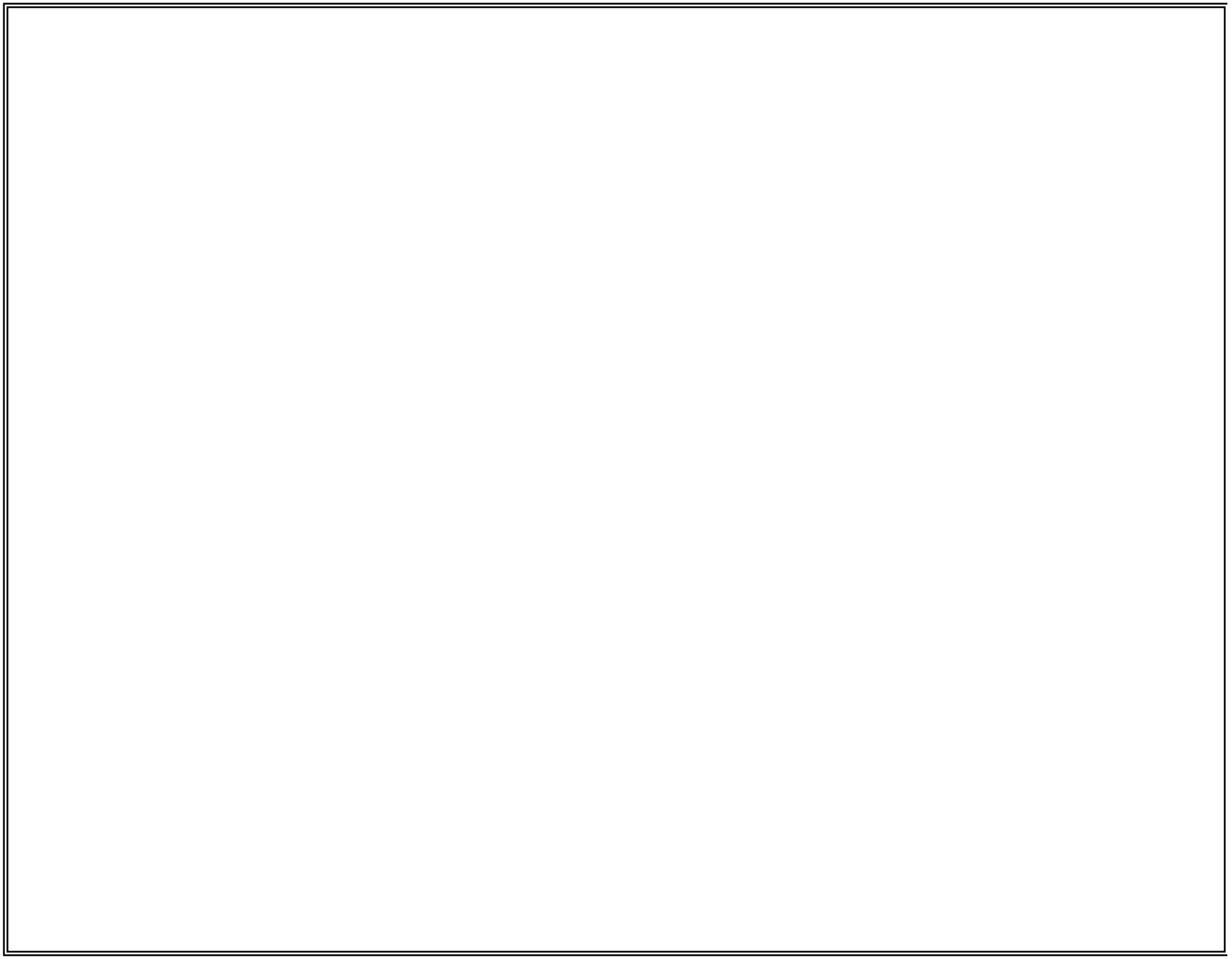
5- Documentation of Test Facility Compliance

5.1 If the test facility successfully completes the evaluation, the CB will issue the appropriate document(s) indicating compliance with Appendix B of this standard.

5.2 If found non-conforming, the CB will issue a report of corrective actions the test facility must address to be compliant.

5.2.1 A second site visit to verify the corrective actions will be at the discretion of the CB.

5.3 Upon the test facility addressing and providing the necessary documentation, the CB will issue the appropriate document(s) indicating compliance with Appendix B of this standard.



APPENDIX D—FLORIDA STANDARDS

FLORIDA STANDARD NO. 3 (FL-3)

FLORIDA REGULATORY REQUIREMENTS FOR PORTABLE ELECTRIC SPA ENERGY EFFICIENCY

The following regulatory requirements shall constitute Florida Standard FL-3 and provide compliance criteria for section 403.9.5 of the *Florida Building Code, Energy Conservation Code*. These requirements follow an Association of Pool & Spa Professional (APSP) ~~draft~~ national standard for portable electric spa energy efficiency that is currently obtaining ANSI approval.

SECTION 1

SCOPE

1.1 These requirements apply to factory built residential portable electric spas that are used for bathing and are operated by a~~n~~ private owner.

1.2 This standard is meant to establish minimum energy efficiency requirements for portable electric spas. This standard shall be met notwithstanding certain variations in equipment, materials, and design (Refer to ANSI/NSPI-6).

1.3 These requirements do not apply to public spas, permanently installed ~~residential~~ spas or other spas, such as those operated for medical treatment, physical therapy or other purposes. Swim-spas and portions of combination spas/swim-spas are included in this standard.

1.4 Other standards are referenced in this standard for items not covered.

SECTION 2

NORMATIVE REFERENCES

APSP-6 Standard for Portable Spas[1]

ISO/IEC 17025 General Requirements for the Competence of Calibration and Testing Laboratories

ISO/IEC Guide 65 General Requirements for Bodies Operating Product Certification Systems

SECTION 3

DEFINITIONS

AMBIENT TEMPERATURE – Air temperature inside testing chamber.

ANCILLARY EQUIPMENT – Additional components used in the construction of the spa beyond pumps, heaters and control systems.

CERTIFICATION BODY (CB) – An independent third party that operates a product, process or service certification system.

CHAMBER – A controlled environment suitable for conducting energy efficiency testing ~~Climate controlled test room.~~

COVER, SPECIFIED – The cover that is provided or specified by the spa manufacturer.

ENERGY EFFICIENCY STANDARD – A performance standard expressed in numerical form, such as energy factor, EER, or thermal efficiency. ~~Using less energy to provide the same level of energy service.~~

FILL VOLUME - The halfway point between the bottom of the skimmer opening and the overflow level ~~top~~ of the spa. In the absence of a ~~If there is no~~ wall skimmer, the fill volume is ~~spa shall be filled with water to~~ six inches below the overflow level ~~top~~ of the spa.

FILTER CYCLE - The period when the control system activates a pump intended to move water through a filter media.

GALLON – Means U.S. liquid gallon

HEATING CYCLE – The period when the temperature regulating system activates the heating component for the purpose of increasing the water temperature.

HOT TUB – See Spa

INGROUND SPA - Non-portable, non-self-contained spa (Refer to ANSI/NSPI-3 Permanent Inground Spas)

NORMALIZE – Calculation of power consumption to eliminate temperature bias.

POWER FACTOR – The ratio of watts to volt-amperes of an AC circuit.

PURGE CYCLE - The period when the control system activates a pump intended to rapidly move water throughout the spa.

SKIMMER, VENTED – A suction opening intended to remove floating debris from the water surface and to be installed where part of the water intake opening is open to atmospheric pressure.

SPA – A product intended for the immersion of persons in heated water circulated in a closed system, and not intended to be drained and filled with each use. A spa usually includes a filter, a heater (electric, solar, or gas), a pump or pumps, and a control, and may also include other equipment, such as lights, blowers, and water sanitizing equipment.

Permanent Residential Spa - A spa in which the water heating and water circulating equipment is not an integral part of the product. The spa shall be intended as a permanent plumbing fixture and shall not be intended to be moved. (Refer to ANSI/NSPI-3 1999 Standard For Permanently Installed Residential Spas.)

Public Spa - Any spa other than a permanent residential spa or residential portable spa which is intended to be used for bathing and is operated by an owner, licensee, concessionaire, regardless of whether a fee is charged for use. (Refer to ANSI/NSPI-2 1999 Standard for Public Spas.)

Residential Portable Spa - Either Self-Contained or Non-Self-Contained (Refer to ANSI/NSPI-6 1999 Standard For Residential Portable Spas.):

Self Contained Spa - A factory built spa in which all control, water heating and water circulating equipment is an integral part of the product. Self-contained spas may be permanently wired or cord connected.

Non-Self-Contained Spa - A factory built spa in which the water heating and circulating equipment is not an integral part of the product. Non-self-contained spas may employ separate components such as an individual filter, pump, heater and controls, or they may employ assembled combinations of various components.

~~STANDARD COVER – The cover that is provided or specified by the spa manufacturer.~~

STANDBY MODE - All settings at default as shipped by the manufacturer, except water temperature which may be adjusted to meet the test conditions. No manual operations are enabled.

SWIMSPA – Variant of a factory built residential portable spa ~~which~~ consist~~s~~ings of a large unobstructed volume of water that allows the 99% male~~/female~~ population to swim. ~~utilizing swim jets for a treadmill like workout, primarily designed for, and constructed with~~ The design and construction of a swim spa includes specific features and equipment ~~required~~ to produce a water flow intended to allow recreational physical activity including, but not limited to, swimming in place.

~~-~~Swim spas may include peripheral jetted seats intended for water therapy, heater, circulation and filtration system, or may be a separate distinct portion of a combination spa/swim spa and may have separate controls.

~~WATT HOUR – Energy consumed over a period of one hour.~~

SECTION 4

QUALIFICATION OF TESTING LABORATORIES AND CERTIFICATION BODIES

4.1 All Certification Bodies (CBs) shall be accredited by a member of IAF (International Accreditation Forum) using ISO/IEC Guide 65, General Requirements for Bodies Operating Product Certification Systems.

4.2 All testing laboratories shall be qualified by a CB

4.2.1 The CB shall assess the testing laboratory's quality system to determine that it satisfies applicable requirements of ISO/IEC 17025.
NOTE: Different parts of ISO/IEC 17025 are applicable to first-party, second-party and third-party laboratories.

4.2.2 Where a laboratory is accredited to ISO/IEC 17025 by a member of ILAC (International Laboratory Accreditation Council) the CB is permitted to accept such accreditation as evidence of conformity to ISO/IEC 17025, in whole or in part.

4.2.3 The CB shall additionally assess the laboratory's facilities, test equipment, testing personnel and test procedures, to establish that the laboratory is competent to perform the tests in this standard.

4.2.4 The CB shall provide a copy of the assessment report to the testing laboratory, and retain a record of the assessment. Any discrepancies identified in the assessment report shall be cleared before the laboratory is deemed qualified.

4.3 Testing laboratories shall demonstrate qualification on a continuing basis.

4.3.1 The CB shall audit the testing laboratory for ISO/IEC 17025 compliance and testing competence on a regular basis.

4.3.1.1 Laboratories accredited by an ILAC member shall be audited at intervals not exceeding three (3) years.

4.3.1.2 Non-accredited laboratories shall be audited annually by the CB.

4.3.2 The CB shall provide a copy of the audit report to the testing laboratory, and retain a record of the audit. Any discrepancies identified in the audit report shall be cleared before the laboratory is deemed re-qualified.

SECTION 5

TEST METHOD

54.1 Purpose: To measure the energy consumption of a portable electric spa in standby mode, using a repeatable and reproducible test procedure. The results will be used to calculate the standby power demand.

5.2 The test facility and equipment will be audited as indicated in 4.3 of this standard to confirm they meet the requirements of this standard. Documentation showing facility and test equipment compliance to this standard from the CB will be maintained on side by the test facility and made available as required. (See Appendix B)

5.3 All eipment shall be calibrated at intervals not to exceed eighteen months, and traceable to NIST or other national standard.

5.4.~~2~~ Test Equipment

~~Note: All equipment shall be calibrated and traceable to the National Institute of Standards and Technology (NIST).~~

5.4.~~2~~.1 Recording Watt Hour meter – Accuracy: Class-2 or better.

5.4.2.~~2~~ Temperature measurement system - Accuracy: +/- 1°F

5.4.~~2~~.3 Water meter to measure fill water in gallons – Accuracy: +/- 1.5%

~~4.3~~5.5 Test Conditions

The test method for portable electric spas is as follows:

~~4.3.~~5.5.1 Minimum continuous testing time shall be 72 hours.

4.~~3~~.5.5.2 The spa shall be filled with water to the halfway point between the bottom of the skimmer opening and the top of the spa. ~~If there is no~~In the absence of a wall skimmer, the ~~spa shall be filled with water to~~ fill volume is six inches below the overflow level ~~top~~ of the spa.

~~4.3.~~5.5.2.1 Measure and record fill volume (V) ~~while filling according to 4.3.2.~~

4.~~3~~5.5.3 The water temperature of the spa or spa portion of a combination swim spa shall be a minimum of 100°F, for the duration of the test. The water temperature of the swim spa or swim portion of a combination swim spa shall be a minimum of 85°F, for the duration of the test.

4.~~3~~5.5.4 The ambient air temperature shall be a maximum of 63°F for the duration of the test.

4.~~3~~5.5.5 The manufacturer's specified ~~standard~~ cover ~~that comes with the unit~~ shall be used during the test.

~~4.4~~5.6 Test Procedure

~~4.4~~5.6.1 The test shall start when the water temperature has been at 102°F, ± 2°F, (at 87°F, ± 2°F for Swim spas) for at least a four hour stabilizing period.

~~4.4~~5.6.2 Record water temperature.

~~4.4.~~5.6.2.1 The thermocouple shall be located three to five inches below the water level and centrally located relative to the shape of the spa.

~~4.4~~5.6.3 Record ambient air temperature at one point located twelve to eighteen inches ~~a maximum of one-to-one-and-a-half feet~~ above spa cover level and six to eight inches from the chamber wall. The temperature probe will be positioned and out of direct airflow from the ~~and out of direct airflow from the chamber temperature control system and/or~~ circulation fan.

~~4.4~~5.6.4 Data Recording

~~4.4~~5.6.4.1 Record temperatures at a maximum interval of ~~5~~4 minutes.

~~4.4.~~5.6.4.2 Measure voltage, current, and power factor (OPTIONAL) at a maximum interval of ~~5~~4 minutes.

~~4.4.~~5.6.4.3 Record watt-hours, voltage and current used during entire Test Period.

~~4.4.~~5.6.4.4 Record elapsed time during Test Record.

~~4.4~~5.6.5 Record the total energy use for the period of test, starting at the end of the first heating cycle after the stabilization period and finishing at the end of the first heating cycle after 72 hours has elapsed.

Exception: For spas without heaters, substitute heating cycle with filter or purge cycle.

~~4.4~~5.6.6 The unit shall remain covered and in the default operation mode during the test. Energy-conserving circulation functions, if present, must not be enabled if not appropriate for continuous, long-term use. The minimum filtration rate shall be 12 water turns within a 24 hour period. Ancillary equipment including, but not limited to lights, audio systems, and water treatment devices, shall remain connected to the mains but may be turned off during the test if their controls are user accessible.

SECTION ~~6~~5

FORMULAS

~~5~~6.1 The measured standby power (Pmeas) shall be determined by E/t:

Pmeas = E/t

Where:

E = total energy use during the test (Wh)

t = length of test (hr)

~~5~~6.2 The measured standby power (Pmeas) shall be normalized (P_{norm}) to a temperature difference of 37°F using the equation:

P_{norm} = Pmeas (ΔTideal / ΔTmeas)

Where:

ΔTideal = 37°F

ΔTmeas = Twater avg – Tair avg

Twater avg = Average water temperature during test

Tair avg = Average air temperature during test.

~~5~~6.3 The normalized standby power (Pnorm) shall not be greater than maximum standby power (Pmax):

Pmax = $5(V^{2/3})$

Where:

V = fill volume in gallons

SECTION 7

LABEL REQIREMENTS

7.1 The manufacturer shall include either on or in close proximity to the spa's product label the standby watts rating.

7.2 Wording to be in the following format:

Per ANSI-14 Measured Standby Power Consumption XXXX Watts (Maximum Allowable Standby Power Consumption XXXX Watts)

APPENDIX A (Informative)

This appendix is not part of the American National Standard and is included for information only.

Minimum Chamber Requirements

Chamber internal dimensions:

Minimum 7 feet high

Minimum 1 foot from spa to chamber wall or other internal barrier.

Air flow: If air circulation from the air temperature control equipment is intermittent, install 1 fan in one corner of the chamber, 6 feet from the floor. Direct toward the center of the floor. The fan should move at least 80 CFM of air, and not more than 100 CFM. If the air temperature control equipment continuously circulates air in the chamber, no fan is required.

Chamber Insulation: Walls shall be insulated adequately to maintain proper ambient temperatures.

Chamber Floor: The floor may be insulated with 2" thick R-13 polisocyanurate with radiant barrier on both sides. This insulation shall be laid directly on a level concrete floor or slab or other firm, level surface created for it. The insulating layer shall be sheeted with minimum 1/2" thick plywood to protect the insulation layer and provide a smooth surface to properly position the spas to be tested.

APPENDIX B (Informative)

This appendix is not part of the American National Standard and is included for information only.

Procedure for Establishing Test Facility and Equipment Compliance

This section provides an evaluation procedure to qualify a test facility for the sole purpose of testing to the requirements outlined in **ANSI/APSP 14 Portable Spa Energy Efficiency Standard.**

All evaluations are to be conducted by a CB as defined in Section 3 of this standard.

Any testing performed, data and results obtained, or facility and equipment used prior to the adoption of ANSI/APSP 14 is exempt from the requirements of Appendix B.

1. Test Chamber

1.1 The test chamber will be evaluated to establish compliance with the construction requirements outlined in Appendix A.

1.2 The test chamber must demonstrate the capability to maintain the test environment(s) called for in Section 4 of this standard.

1.2.1 The test chamber will be evaluated operating at the test parameters for a minimum of three hours.

2- Data Measuring and Recording Equipment

2.1. The operator of the test facility will provide proof of calibration traceable to NIST or other national standard for all equipment used to measure and collect data as outlined in Section 4 of this standard.

2.2 The maximum period before equipment recalibration is required will be eighteen months from its previous calibration date.

2.2.1 If the test equipment comes from the manufacturer with a Certificate of Calibration, the time frame for recalibration will be a maximum of eighteen months from date of purchase.

2.3 Calibration records (electronic or hard copy), will be kept by the test facility and made available upon request by the evaluating CB.

3- Training of Personnel

3.1 The test facility will designate the person, and alternates, responsible for training other employees in the requirements of performing the ANSI 14 Portable Spa Energy Efficiency Testing.

3.1.1 Training records will include:

The person(s) doing the training

Date(s) the training took place

Facility and chamber used

3.2 The test facility will keep employee training records and provide them to the CB upon request.

4- Record Maintenance

4.1 Upon request of the CB, the test facility will provide a copy of all forms used, (electronic or hard copy), to record the required test data.

4.2 The CB may review previous testing performed for compliance to this standard.

5- Documentation of Test Facility Compliance

5.1 If the test facility successfully completes the evaluation, the CB will issue the appropriate document(s) indicating compliance with Appendix B of this standard.

5.2 If found non-conforming, the CB will issue a report of corrective actions the test facility must address to be compliant.

5.2.1 A second site visit to verify the corrective actions will be at the discretion of the CB.

5.3 Upon the test facility addressing and providing the necessary documentation, the CB will issue the appropriate document(s) indicating compliance with Appendix B of this standard.

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The Global Source and Voice for the Recreational Water Industry

APSP-14- Portable Spa Energy Efficiency Standard

1. Scope

1.1 These requirements apply to factory built residential portable spas that are used for bathing and are operated by an owner.

1.2 This standard is meant to establish minimum energy efficiency requirements for spas. This standard shall be met notwithstanding certain variations in equipment, materials, and design (Refer to ANSI/NSPI-6).

1.3 These requirements do not apply to public spas, permanently installed residential spas or other spas, such as those operated for medical treatment, physical therapy or other purposes. Swim-spas and portions of combination spas/swim-spas are included in this standard.

1.4 Other standards are referenced in this standard for items not covered.

2. Normative reference

APSP-6 Standard for Portable Spas[1]

3. Definitions

AMBIENT TEMPERATURE – Air temperature inside testing chamber.

ANCILLARY EQUIPMENT – Additional components used in the construction of the spa beyond pumps, heaters and control systems.

CHAMBER – Climate controlled test room.

ENERGY EFFICIENCY – Using less energy to provide the same level of energy service.

FILL VOLUME - The halfway point between the bottom of the skimmer opening and the top of the spa. If there is no wall skimmer, the spa shall be filled with water to six inches below the top of the spa.

FILTER CYCLE - The period when the control system activates a pump intended to move water through a filter media.

GALLON – Means U.S. liquid gallon

HEATING CYCLE – The period when the temperature regulating system activates the heating component for the purpose of increasing the water temperature.

HOT TUB – See Spa
[1]

INGROUND SPA - Non-portable, non-self-contained spa (Refer to ANSI -3 Permanent Inground Spas)

NORMALIZE – Calculation of power consumption to eliminate temperature bias.

[1] Association of Pool & Spa Professionals (APSP) (formerly National Spa and Pool Institute (NSPI), 2111 Eisenhower Avenue, Alexandria, VA 22314

NRTL – Nationally Recognized Test Laboratory

POWER FACTOR – The ratio of watts to volt-amperes of an AC circuit.

PURGE CYCLE - The period when the control system activates a pump intended to rapidly move water throughout the spa.

SKIMMER – A suction opening intended to remove floating debris from the water surface and to be installed where part of the water intake opening is open to atmospheric pressure.

SPA – A product intended for the immersion of persons in heated water circulated in a closed system, and not intended to be drained and filled with each use. A spa usually includes a filter, a heater (electric, solar, or gas), a pump or pumps, and a control, and may also include other equipment, such as lights, blowers, and water sanitizing equipment.

Permanent Residential Spa - A spa in which the water heating and water circulating equipment is not an integral part of the product. The spa shall be intended as a permanent plumbing fixture and shall not be intended to be moved. (Refer to ANSI/NSPI-3 1999 Standard For Permanently Installed Residential Spas.)

Public Spa - Any spa other than a permanent residential spa or residential portable spa which is intended to be used for bathing and is operated by an owner, licensee, concessionaire, regardless of whether a fee is charged for use. (Refer to ANSI/NSPI-2 1999 Standard for Public Spas.)

Residential Portable Spa - Either Self-Contained or Non-Self-Contained (Refer to ANSI/NSPI-6 1999 Standard For Residential Portable Spas.):

Self Contained Spa - A factory built spa in which all control, water heating and water circulating equipment is an integral part of the product. Self-contained spas may be permanently wired or cord connected.

Non-Self-Contained Spa - A factory built spa in which the water heating and circulating equipment is not an integral part of the product. Non-self-contained spas may employ separate components such as an individual filter, pump, heater and controls, or they may employ assembled combinations of various components.

STANDARD COVER – The cover that is provided or specified by the spa manufacturer.

STANDBY MODE - All settings at default as shipped by the manufacturer, except water temperature which may be adjusted to meet the test conditions. No manual operations are enabled.

SWIMSPA –Variant of a Residential Portable Spa which consists of a large unobstructed volume of water primarily designed for, and constructed with specific equipment required to produce a water flow intended to allow recreational physical activity including, but not limited to, swimming in place.

Swim spas may include peripheral jetted seats intended for water therapy, heater, circulation and filtration system, or may be a separate distinct portion of a combination spa/swim spa with separate controls.

WATT HOUR – Energy consumed over a period of one hour.

4. Test Method

4.1 Purpose: To measure the energy consumption of a portable electric spa in standby mode, using a repeatable and reproducible test procedure. The results will be used to calculate the standby power demand.

4.2 Test Equipment

Note: All equipment shall be calibrated and traceable to the National Institute of Standards and Technology (NIST). The test facility and equipment will be evaluated by a NRTL to confirm they meet the requirements of this standard. Documentation showing facility and test equipment compliance to this standard from the NRTL will be maintained on site by the test facility and made available as required.

4.2.1 Recording Watt Hour meter – Accuracy: Class-2 or better.

4.2.2 Temperature measurement system - Accuracy: +/- 1°F

4.2.3 Water meter to measure fill water in gallons – Accuracy: +/- 1.5%

4.3 Test Conditions

The test method for portable electric spas is as follows:

4.3.1 Minimum continuous testing time shall be 72 hours.

4.3.2 The spa shall be filled with water to the halfway point between the bottom of the skimmer opening and the top of the spa. If there is no wall skimmer, the spa shall be filled with water to six inches below the top of the spa.

4.3.2.1 Measure and record fill volume (V) while filling according to 4.3.2.

4.3.3 The water temperature of the spa or spa portion of a combination swim spa shall be a minimum of 100°F, for the duration of the test. The water temperature of the swim spa or swim portion of a combination swim spa shall be a minimum of 85°F, for the duration of the test.

4.3.4 The ambient air temperature shall be a maximum of 63°F for the duration of the test.

4.3.5 The standard cover that comes with the unit shall be used during the test.

4.4 Test Procedure

4.4.1 The test shall start when the water temperature has been at 102°F, ±2°F, (at 87°F, ± 2°F for swimspas) for at least a four hour stabilizing period.

4.4.2 Record water temperature.

4.4.2.1 The thermocouple shall be located three to five inches below the water level and centrally located relative to the shape of the spa.

4.4.3 Record ambient air temperature at one point located a maximum of one to one and a half feet above spa cover level and six to eight inches from the chamber wall and out of direct airflow from the chamber temperature control system and/or circulation fan.

4.4.4 Data Recording

4.4.4.1 Record temperatures at a maximum interval of 4 minutes.

4.4.4.2 Measure voltage, current, and power factor (OPTIONAL) at a maximum interval of 4 minutes.

4.4.4.3 Record watt-hours, voltage and current used during entire Test Period.

4.4.4.4 Record elapsed time during Test Record.

4.4.5 Record the total energy use for the period of test, starting at the end of the first heating cycle after the stabilization period and finishing at the end of the first heating cycle after 72 hours has elapsed.

Exception: For spas without heaters, substitute heating cycle with filter or purge cycle.

4.4.6 The unit shall remain covered and in the default operation mode during the test. Energy-conserving circulation functions, if present, must not be enabled if not appropriate for continuous, long-term use. The minimum filtration rate shall be 12 water turns within a 24 hour period. Ancillary equipment including, but not limited to lights, audio systems, and water treatment devices, shall remain connected to the mains but may be turned off during the test if their controls are user accessible.

5. Formulas

5.1 The measured standby power (Pmeas) shall be determined by E/t:

$Pmeas = E/t$

Where:

E = total energy use during the test (Wh)
t = length of test (hr)

5.2 The measured standby power (Pmeas) shall be normalized (P_{norm}) to a temperature difference of 37°F using the equation:

$P_{norm} = Pmeas\ (\Delta Tideal / \Delta Tmeas)$

Where:

ΔTideal = 37°F
ΔTmeas = Twater avg – Tair avg
Twater avg = Average water temperature during test
Tair avg = Average air temperature during test.

5.3 The normalized standby power (Pnorm) shall not be greater than maximum standby power (Pmax):

$Pmax = 5(V^{2/3})$

Where:

V = fill volume in gallons

6. Label Requirements

6.1 The manufacturer shall include either on or in close proximity to the spa's product label the standby watts rating.

6.2 Wording to be in the following format:

Per ANSI-14 Measured Standby Power Consumption XXXX watts/hr
(Maximum Allowable Standby Power Consumption XXXX watts/hr)

APPENDIX A

Minimum Chamber Requirements

Chamber internal dimensions:

Minimum 7 feet high

Minimum 1 foot from spa to chamber wall or other internal barrier.

Air flow: If air circulation from the air temperature control equipment is intermittent, install 1 fan in one corner of the chamber, 6 feet from the floor. Direct toward the center of the floor. The fan should move at least 80 CFM of air, and not more than 100 CFM. If the air temperature control equipment continuously circulates air in the chamber, no fan is required.

Chamber Insulation: Walls shall be insulated adequately to maintain proper ambient temperatures.

Chamber Floor: The floor may be insulated with 2" thick R-13 polisocyanurate with radiant barrier on both sides. This insulation shall be laid directly on a level concrete floor or slab or other firm, level surface created for it. The insulating layer shall be sheeted with minimum 1/2" thick plywood to protect the insulation layer and provide a smooth surface to properly position the spas to be tested.

Sub Code: Energy Conservation

EN3847

Date Submitted	3/24/2010	**Section**	101.5.1	**Proponent**	Ann Stanton
Chapter	1	**Affects HVHZ**	No	**Attachments**	No

TAC Recommendation Approved as Submitted
Commission Action Pending Review

Related Modifications

4462, 4467, 4457, 4461

Summary of Modification

Reserve code section that would allow the code official to accept software and other materials for code compliance that are not specified in the code.

Rationale

Specific code compliance materials are specified in the code.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

None expected. Consistency of code enforcement by consistency of materials.

Impact to building and property owners relative to cost of compliance with code

None.

Impact to industry relative to the cost of compliance with code

None.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Yes. Would ensure that a minimum standard of efficiency is met.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Yes.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

No.

Does not degrade the effectiveness of the code

No.

2nd Comment Period 09/03/2010 - 10/18/2010

Proponent Arlene Stewart **Submitted** 10/18/2010 **Attachments** No

EN3847-G1

Comment:

TAC action should be overturned because there is no Florida specific need identified, especially in light of TAC actions on Mod 4457 & 4467

101.5.1 Compliance materials. Reserved. ~~The code official shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.~~

EN4433

Date Submitted	4/2/2010	**Section**	303.2	**Proponent**	Ann Stanton
Chapter	3	**Affects HVHZ**	No	**Attachments**	No

TAC Recommendation Approved as Submitted
Commission Action Pending Review

Related Modifications

4442

Summary of Modification

Add criteria for insulation installation from the appendices of the present Florida energy code that were inadvertently omitted from the Florida-specific criteria included in the base code.

Rationale

This mod would put back into the code general requirements for insulation installation that were previously contained in the appendices to the Florida energy code. The base code does not provide this level of detail.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

Would provide backup to code officials who see poorly installed insulation.

Impact to building and property owners relative to cost of compliance with code

Would ensure that insulation is adequately installed.

Impact to industry relative to the cost of compliance with code

Would require insulation be installed correctly.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Yes, poorly installed insulation does not perform as designed.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Yes, provides more detailed criteria by which insulation should be installed.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

No.

Does not degrade the effectiveness of the code

No.

2nd Comment Period 09/03/2010 - 10/18/2010

Proponent Arlene Stewart **Submitted** 10/18/2010 **Attachments** No

EN4433-G1

Comment:

TAC Action should be overturned as this language is not in the IECC and no Florida-specific climate related justification was included with the original submission. Concept and language should be submitted to the IECC as part of the ICC code development process.

SECTION 303

MATERIALS, SYSTEMS AND EQUIPMENT

303.1 Identification

303.2 Insulation i~~I~~nstallation. Insulation materials shall comply with the requirements of their respective ASTM standard specification and shall be installed in accordance with their respective ASTM installation practice in Table 303.2 in such a manner as to achieve rated R-value of insulation. Open-blown or poured loose-fill insulation shall not be used in attic roof spaces when the slope of the ceiling is more than three in twelve. When eave vents are installed, baffling of the vent openings shall be provided to deflect the incoming air above the surface of the insulation.

Exception: Where metal building roof and metal building wall insulation is compressed between the roof or wall skin and the structure.

TABLE 303.2

INSULATION INSTALLATION STANDARDS

Insulation Material	Standard Specification	Installation Practice
Mineral Fiber Batt/Blanket	ASTM C 665	ASTM C 1320
Mineral Fiber Loose Fill	ASTM C 764	ASTM C 1015
Cellulose Loose Fill	ASTM C 739	ASTM C 1015
Polystyrene Foam	ASTM C 578	
Polyisocyanurate Foam	ASTM C 1289	
Reflective	ASTM C 1224	ASTM C 727
Radiant Barrier	ASTM C 1313	ASTM C 1158
Vermiculite	ASTM C 516	
Perlite	ASTM C 549	
Spray-Applied Rigid Cellular Polyurethane Foam	ASTM C 1029	
Interior Radiation Control Coating Systems	ASTM C 1321	

303.2.1 Compressed insulation. Insulation that has been compressed to 85-percent or less of the manufacturer's rated thickness for the product shall use the R-values given in Table 303.2.1. These values are to be used except where data developed by an independent testing laboratory is provided.

TABLE 303.2.1

R-VALUES OF COMPRESSED INSULATION

% of Original Thickness	R-5	R-7	R-11	R-14	R-19	R-30	R-38
90	5	6	10	13	18	28	36
80	4	6	10	12	17	26	33
70	4	5	9	11	15	24	30
60	3	5	8	10	14	22	27
50	3	4	7	9	12	18	24
40	2	4	6	8	10	15	20
30	2	3	4	6	8	12	16
20	20	2	2	3	4	10	10

303.2.2 Substantial Contact. Insulation shall be installed in a permanent manner in substantial contact with the inside surface in accordance with manufacturer's recommendations for the framing system used. Flexible batt insulation installed in floor cavities shall be supported in a permanent manner by supports no greater than 24 inches (610 mm) on center (o.c.).

Exception: Insulation materials that rely on airspaces adjacent to reflective surfaces for their rated performance.

303.2.3 Recessed Equipment. Lighting fixtures; heating, ventilating, and air-conditioning equipment, including wall heaters, ducts, and plenums; and other equipment shall not be recessed in such a manner as to affect the insulation thickness unless:

1. The total combined area affected (including necessary clearances) is less than one percent of the opaque area of the assembly, or

2. The entire roof, wall, or floor is covered with insulation to the full depth required, or

3. The effects of reduced insulation are included in calculations using an area-weighted average method and compressed insulation values obtained from Table 303.2.1.1.

In all cases, air leakage through or around the recessed equipment to the conditioned space shall be limited in accordance with Section 404.2.5 or 502.3.8, as applicable.

303.2.4 Insulation Protection. Exterior insulation shall be covered with a protective material to prevent damage from sunlight, moisture, landscaping operations, equipment maintenance, and wind. In attics and mechanical rooms, a way to access equipment that prevents damaging or compressing the insulation shall be provided. Foundation

vents shall not interfere with the insulation. Insulation materials in ground contact shall have a water absorption rate no greater than .3 percent when tested in accordance with ASTM C272,

~~303.2.1 Protection of exposed foundation insulation.~~ ~~Insulation applied to the exterior of basement walls, crawlspace walls and the perimeter of slab-on-grade floors shall have a rigid, opaque and weather-resistant protective covering to prevent the degradation of the insulation's thermal performance. The protective covering~~ shall cover the exposed exterior insulation and shall extend a minimum of 6 inches (153 mm) below grade.

EN4438

Date Submitted	4/2/2010	**Section**	304	**Proponent**	Ann Stanton
Chapter	3	**Affects HVHZ**	No	**Attachments**	No

TAC Recommendation Approved as Submitted
Commission Action Pending Review

Related Modifications

4433

Summary of Modification

Add criteria for determining thermal properties of building materials and assemblies.

Rationale

How the thermal properties of building materials/assemblies are determined can mean the difference between a building passing and failing code; also the building may not perform as designed. Such criteria have been included in the appendices of Florida's energy code for some time. This mod would include them in the new Energy Conservation code.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

Not much, unless the code official understands the basics of thermal properties of buildings and the procedures by which they are determined.

Impact to building and property owners relative to cost of compliance with code

Ensures that a building will meet code and perform as designed.

Impact to industry relative to the cost of compliance with code

Avoids gaming and misleading claims based on inadequate tests.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Yes, ensures that the thermal parameters of a building are calculated correctly.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Yes, ensures that the thermal parameters of a building are calculated correctly.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

Provides a consistent standard for determining the thermal properties of building materials.

Does not degrade the effectiveness of the code

No.

2nd Comment Period 09/03/2010 - 10/18/2010

Proponent Arlene Stewart **Submitted** 10/18/2010 **Attachments** No

EN4438-G1

Comment:

TAC Action should be overturned as this language is not in the IECC and no Florida-specific climate related justification was included with the original submission. Concept and language should be submitted to the IECC as part of the ICC code development process.

SECTION 304

MATERIALS TESTING AND THERMAL PROPERTIES

304.1 Building material thermal properties, general.

304.1.1 Commerical and residential high rise. R-values for building materials used to demonstrate code compliance with Chapter 5shall be taken from ASHRAE 90.1 Normative Appendix A, from the EnergyGauge Summit Fla/Com computer program, from manufacturer's product literature or from other nationally recognized engineering sources. Assembly U-factor calculations shall follow the procedure(s) detailed in section 304.3 or be tested in accordance with procedures(s) described in section 304.2.

Concrete block R-values shall be calculated using the isothermal planes method or a two-dimensional calculation program, thermal conductivities from ASHRAE 90.1 Normative Appendix A, from the EnergyGauge Summit Fla/Com program and dimensions from ASTM C90. The parallel path calculation method is not acceptable.

Exception: R-values for building materials or thermal conductivities determined from testing in accordance with Section 304.2.

304.1.2 Residential one- and two-family. R-values referenced in Chapter 4 of this code refer to the R-values of the added insulation only. The R-values of structural building materials such as framing members, concrete blocks or gypsum board shall not be included. Insulation levels shall be achieved with insulation products tested and rated according to the procedures recognized by the Federal Trade Commission (FTC) in 16 CFR Part 460.

304.1.2.1 When installing two layers of bulk or board insulation, the R-values of each material may be added together for a total R-value. When installing two separate reflective insulation products in layers, the total R-value of the system shall have been achieved by testing under FTC regulations, 16 CFR Part 460.

304.2 Testing of Building Materials Thermal Properties.

304.2.1 Single materials. If building material R-values or thermal conductivities are determined by testing, one of the following test procedures shall be used:

a. ASTM C177

b. ASTM C236

c. ASTM C518

For concrete, the oven-dried conductivity shall be multiplied by 1.2 to reflect the moisture content as typically installed.

304.2.2 Assembly U-factors. If assembly U-factors are determined by testing, ASTM C1363 shall be used.

Product samples tested shall be production line material or representative of material as purchased by the consumer or contractor. If the assembly is too large to be tested at one time in its entirety, then either a representative portion shall be tested or different portions shall be tested separately and a weighted average determined. To be

representative, the portion tested shall include edges of panels, joints with other panels, typical framing percentages, and thermal bridges.

304.3 Calculation procedures and assumptions. The following procedures and assumptions shall be used for all Chapter 5 code calculations. R-values for air films, insulation, and building materials shall be taken from Sections 304.3.1 or 304.3.2, respectively. In addition, the appropriate assumptions listed, including framing factors, shall be used.

304.3.1 Air Films: Prescribed R-values for air films shall be as follows:

R-Value	Condition
0.17	All exterior surfaces
0.46	All semi-exterior surfaces
0.61	Interior horizontal surfaces, heat flow up
0.92	Interior horizontal surfaces, heat flow down
0.68	Interior vertical surfaces

304.3.1.1 Exterior surfaces are areas exposed to the wind.

304.3.1.2 Semi-exterior surfaces are protected surfaces that face attics, crawl spaces, and parking garages with natural or mechanical ventilation.

304.3.1.3 Interior surfaces are surfaces within enclosed spaces.

304.3.1.4 The R-value for cavity airspaces included in the EnergyGauge Summit Fla/Com program are taken from ASHRAE 90.1 Normative Appendix A. No credit shall be given for airspaces in cavities that contain any insulation or less than 0.5 inch (12.7 mm). The values for 3.5 inch (84 mm) cavities shall be used for cavities of that width and greater.

304.3.2 Assembly U-Factor, C-Factor and F-Factor Calculation

304.3.2.1 Pre-calculated assembly U-factors, C-factors, F-factors, or heat capacities. The U-factors, C-factors, F-factors, and heat capacities for typical construction assemblies included in the EnergyGauge Summit Fla/Com computer program are taken from ASHRAE 90.1 Normative Appendix A. These values shall be used for all calculations unless otherwise allowed by applicant-determined assembly U-factors, C-factors, F-factors, or heat capacities. Interpolation between values for rated R-values of insulation, including insulated sheathing is allowed; extrapolation beyond values in the ASHRAE 90.1 Normative Appendix A tables is not.

304.3.2.2 Applicant-determined assembly U-factors, C-factors, F-factors, or heat capacities. If the building official determines that the proposed construction assembly is not adequately represented in the appropriate table of ASHRAE 90.1 Normative Appendix A, the applicant shall determine appropriate values for the assembly using the assumptions in ASHRAE 90.1 Normative Appendix A. An assembly is deemed to be adequately represented if:

a. the interior structure, hereafter referred to as the base assembly, for the class of construction is the same as described in Normative Appendix A and

b. changes in exterior or interior surface building materials added to the base assembly do not increase or decrease the R-value by more than 2 from that indicated in the descriptions in ASHRAE 90.1 Normative Appendix A.

Insulation, including insulated sheathing, is not considered a building material.

EN4258

Date Submitted	4/1/2010	**Section**	402.1.1	**Proponent**	Amy Schmidt
Chapter	4	**Affects HVHZ**	No	**Attachments**	No

TAC Recommendation Approved as Submitted
Commission Action Pending Review

Related Modifications

None

Summary of Modification

Removing footnote From Table 402.1.1, language that does not apply to FL requirements.

Rationale

The FL code does not require Floor Insulation greater than R-13 so footnote g does not apply.

The FL code does not have a cavity + continuous wall insulation option shown in the table therefore footnote h does not apply.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

None

Impact to building and property owners relative to cost of compliance with code

None

Impact to industry relative to the cost of compliance with code

None

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

This modification does not diminish the the health, safety, or welfare of the general public.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Removal of this footnote language will make the code less cluttered and prevent misinterpretation.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

This modification does not discriminate against materials, products, methods, or systems of construction.

Does not degrade the effectiveness of the code

This modification only enhances the effectiveness of the code by preventing any confusion.

2nd Comment Period 09/03/2010 - 10/18/2010

Proponent Arlene Stewart **Submitted** 10/18/2010 **Attachments** No

EN4258-G1

Comment:

TAC Action should be overturned as deleting it creates an excessive Florida specific changes for which there is no applicability.

g. Reserved ~~Or insulation sufficient to fill the framing cavity, R-19 minimum.~~

h. Reserved ~~"13+5" means R-13 cavity insulation plus R-5 insulated sheathing. If structural sheathing covers 25 percent or less of the exterior, insulating sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25 percent of exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.~~

Date Submitted	3/26/2010	**Section**	402.2.5	**Proponent**	Joe Nebbia
Chapter	4	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation Approved as Submitted
Commission Action Pending Review

Related Modifications

Summary of Modification

Establishes equivalency table for steel framed wall assemblies with stud spacing at 24 inches.

Rationale

This adds choices for steel framed walls by adding values for 24 inch stud spacing, adding flexibility and encouraging efficient framing. It also corrects a limitation in the code. The values are derived from the US DOE's RESCheck. Builders would also be able to use the U-factor tables found in the ASHRAE 90.1. See attached for further rationale.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

This will increase costs of code enforcement as U-factor equivalency is already allowed by code. This table will add the benefit of a clearly referencable table for code officials and builders.

Impact to building and property owners relative to cost of compliance with code

This will not increase the cost relative to building and property owners. It will add in design and construction.

Impact to industry relative to the cost of compliance with code

This code change will not add cost to industry relative to compliance. It will add flexibility in compliance.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

It enhances the flexibility of the energy code while encouraging material efficient framing, mitigating effects on the environment.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

It enhances flexibility while encouraging material efficient framing. It corrects current limitations in the code.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

It provides more flexibility for alternative materials (steel framing) to comply with the code.

Does not degrade the effectiveness of the code

It does not degrade the effectiveness of the code because the change is energy neutral and only established more equivalency values.

2nd Comment Period 09/03/2010 - 10/18/2010

Proponent Arlene Stewart **Submitted** 10/18/2010 **Attachments** No

EN3943-G1

Comment:

TAC Action should be overturned as this language is not in the IECC and no Florida-specific climate related justification was included with the original submission. Original IECC language should be restored. Concept and language should be submitted to the IECC as part of the ICC code development process.

402.2.5 Steel-frame ceilings, walls, and floors. Steel frame ceilings, walls and floors shall meet the insulation requirements of Table 402.2.5 or shall meet the U-factor requirements in Table 402.1.3. The calculation of the U-factor for a steel-frame envelope assembly shall use a series-parallel path calculation method.

Exception: ~~In Climate Zones 1 and 2, the continuous insulation requirements in Table~~

~~402.2.54 shall be permitted to be reduced to R-3 for s~~Steel frame wall assemblies with studs spaced at 24 inches (610 mm) on center shall be permitted to use the equivalent insulation requirements in Table 402.2.5.(2):

TABLE 402.2.5.(2) – STEEL FRAME WALL INSULATION R-VALUE FOR 24 INCH SPACING OF STUDS

Wood frame wall R-value requirement	Steel frame wall equivalent R-value at 24 inch spacing of studs
R-13	13+3.0 or 15+2.4 or 0+9.3
R-19	13+7.4 or 15+6.8 or 19+6.0 or 21+5.6
R-20	13+7.6 or 15+7.1 or 19+6.3 or 21+5.9
R-21	13+8.3 or 15+7.7 or 19+6.9 or 21+6.5

Alternatively, steel frame wall assemblies shall be permitted to use the equivalencies established in ASHRAE/IESNA Standard 90.1 Appendix A, Tables A 3.3 and A3.4.

The objective of this proposal is to expand the current equivalency choices for steel framed walls by adding values for 24 inch stud spacing. This adds flexibility while encouraging builders to use 24 inch stud spacing, thus optimizing thermal efficiency of walls and reducing material impacts on the environment.

This change also eliminates a current limitation in the code. The current exception to Section 402.2.5 allows for reduction of continuous insulation values to R-3 for steel framed assemblies regardless of the reference wood assembly cavity insulation requirement. This table provides specific steel framed equivalencies to wood framed walls with cavity values other than R-13 – allowing flexibility in the updating of the code. The proposed equivalent insulation values in the table are derived from the US Department of Energy's RESCheck simulation program and are nationally recognized. Alternatively, builders would be allowed to use the U-factor tables found in the ASHRAE/IESNA 90.1.

EN4058

Date Submitted	3/29/2010	**Section**	403.6, 403.6.1, 403.6.1.1	**Proponent**	Robert Volin
Chapter	4	**Affects HVHZ**	No	**Attachments**	No

TAC Recommendation Approved as Submitted
Commission Action Pending Review

Related Modifications

None

Summary of Modification

None

Rationale

makes code easer for inspectors to understand plus already in Code

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

None

Impact to building and property owners relative to cost of compliance with code

Selecting the proper size equipment will save homeowners energy

Impact to industry relative to the cost of compliance with code

None

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

None

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Clarifying the code in relation to equipment selection, plus already in code

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

No

Does not degrade the effectiveness of the code

No

2nd Comment Period 09/03/2010 - 10/18/2010

EN4058-G1

Proponent	Arlene Stewart	**Submitted**	10/17/2010	**Attachments**	No

Comment:

TAC Action should be overturned as this language is not in the IECC and no Florida-specific climate related justification was included with the original submission. Concept and language should be submitted to the IECC as part of the ICC code development process.

403.6 Heating and Cooling Equipment ~~sizing~~ (Mandatory).

403.6.1 Equipment sizing. Heating and cooling equipment shall be sized in accordance with ACCA Manual S based on the equipment loads calculated in accordance with Manual J or other approved heating and cooling calculation methodologies, based on building loads for the directional orientation of the building. ~~in accordance with Section M1401.3 of the *International Residential Code*.~~ The manufacturer and model number of the outdoor and indoor units (if split system) shall be submitted along with the sensible and total cooling capacities at the design conditions described in Section 302.1. This Code does not allow designer safety factors, provisions for future expansion or other factors which affect equipment sizing. System sizing calculations shall not include loads created by local intermittent mechanical ventilation such as standard kitchen and bathroom exhaust systems.

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

The published value for ARI total capacity is a nominal, rating-test value and shall not be used for equipment sizing. Manufacturer's expanded performance data shall be used to select cooling-only equipment. This selection shall be based on the outdoor design dry bulb temperature for the load calculation (or entering water temperature for water-source equipment), the blower CFM provided by the expanded performance data, the design value for entering wet bulb temperature and the design value for entering dry bulb temperature.

Design values for entering wet bulb and dry bulb temperature shall be for the indoor dry bulb and relative humidity used for the load calculation and shall be adjusted for return side gains if the return duct(s) is installed in an unconditioned space.

Exceptions:

1. Attached single- and multiple-family residential equipment sizing may be selected so that its cooling capacity is less than the calculated total sensible load but not less than 80 percent of that load.

2. When signed and sealed by a Florida-registered engineer, in attached single- and multiple-family units, the capacity of equipment may be sized in accordance with good design practice.

~~Manufacturer's expanded performance data shall be used to select cooling-only equipment. in accordance with ACCA Manual S. The published value for AHRI total capacity is a nominal, rating-test value and shall not be used for equipment sizing.~~

Date Submitted	4/1/2010	**Section**	405	**Proponent**	Jeff Sonne
Chapter	4	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation Approved as Submitted
Commission Action Pending Review

Related Modifications

None.

Summary of Modification

Makes two section 405 EnergyGauge USA FlaRes water heater changes: 1) Allow primary heat pump water heater entries and energy factor (EF) entries for primary and add-on heat pump water heaters 2) Internally modify water heater energy factors based on typical residential water draw profiles.

Rationale

Entry of primary heat pump water heater systems and energy factors for these and add-on heat pump water heaters, and internally modifying water heater energy factors in EnergyGauge USA FlaRes based on typical residential water draw profiles provide simplified and more accurate section 405 performance code compliance calculations. A publication to the U.S. DOE indicating annual test results using typical residential water draw profiles will be forthcoming from the Florida Solar Energy Center.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

In applicable cases, should simplify and assist code enforcement since these changes allow reporting to show actual systems and energy factors on compliance forms.

Impact to building and property owners relative to cost of compliance with code

None for primary heat pump water heater and energy factor entry changes; modification of enery factors may result in some small cost impact for those selecting certain types of water heaters.

Impact to industry relative to the cost of compliance with code

In applicable cases, the new water heating entry options should decrease the time required to complete compliance calculations.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Public is benefited by facilitating component entry into code calculation software and more accurate energy code calculations.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Improves accuracy of energy code calculations.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

Neutral; only concerns equipment entry in code calculation software and improving accuracy of code calculation.

Does not degrade the effectiveness of the code

Improves code effectiveness by facilitating correct code calculation software inputs and providing more accurate energy code calculations.

2nd Comment Period 09/03/2010 - 10/18/2010

EN4322-G1

Proponent Scott Ranck **Submitted** 9/27/2010 **Attachments** No

Comment:

I read the FSEC study on the water heater testing and protocol. I am concerned that recognized programs like ENERGY STAR require testing verification for each brand and even each model of a product before it can receive their label. How can one brand, one model of a water heater be tested and then be considered representative for all brands and all models of the same type? For example, one brand Takagi, and one model of a gas tankless water heater was tested. So now you propose to incorporate into EnergyGauge those efficiencies across the board for all brands and models of gas tankless water heaters? What about independent third party verifications that other brands like Rinnai or Noritz have already done on their products? Was the results of this study peer reviewed? I suggest much more testing should be required before the EnergyGuage software can be changed. One study on seven products should not be enough to over rule all the third party verification and testing that has been previously done to establish the energy factors on these water heaters. The ramifications are far reaching to this change. Our building code has minimum energy factors for water heaters, will any water heaters currently available be able to meet our code if we lower all their efficiency factors as this study suggests. Will any still qualify for the federal energy efficient tax credit. Will any still qualify for ENERGY STAR? Will all other rating software's change to line up with this study? Will all other labratories testing results be thrown aside and be required to bow to this study? These are just some of the ramifications that require far more consideration before this change is implemented.

2nd Comment Period 09/03/2010 - 10/18/2010

EN4322-G2

Proponent Jeff Sonne **Submitted** 10/13/2010 **Attachments** Yes

Comment:

See attached file.

2nd Comment Period 09/03/2010 - 10/18/2010

EN4322-G3

Proponent	Adam Brown	Submitted	10/14/2010	Attachments	Yes

Comment:

Refer to attached comment file.

2nd Comment Period 09/03/2010 - 10/18/2010

EN4322-G4

Proponent	Jim Gregorich	Submitted	10/15/2010	Attachments	No

Comment:

In the process of analysing the test data I find several issues. It states on page 9 " A 3/4" gas line sized to two-inch water column (i.w.c.) of gas pressure capacity over 140 ft. in length was installed to provide narural gas to the standard 40 gallon tank and residential tankless system. A fourteen i.w.c. pressure -reducing valve was installed at the service meter supplying the gas operating service typical for this region in Florida. However pressure was reduced further to 10.0 i.w.c. to each gas appliance respectively. (A maximum operating pressure of 10.5 i.w.c. is posted on the front of the tankless natural gas system."

Problems:
1-A 3/4" line sized to two -inch water column (i.w.c.) for 140' will not work!
2-The "blue handle" shutoff just down stream of the meter is a reduced port ball valve which is restricting gas flow thus impeading the efficiency . A full port valve is required for this application.
3-The pressure regulator installed before the equipment is a Maxitrol 325-5AL which is a pounds to inches line regulator not an inches to inches regulator which is required for the installation as shown in the document provided which will not regulate period. In fact it is a flow restriction preventing the heater from firing at peak performance therefore rendering the testing inaccurate. Please consider these facts when making your decision. Documentation and regulator performance and application as well as documentation regarding the regulator used and misapplied is available upon request.

2nd Comment Period 09/03/2010 - 10/18/2010

EN4322-G5

Proponent	Randy Sortore	Submitted	10/17/2010	Attachments	No

Comment:

It seems illogical to take test results from one tankless water heater, and apply those test results to every other brand and model of tankless water heaters. With the valve, regulator and pressure issues that were identified in comment EN4322-G4, clearly more testing should be performed before a major modification like this is approved. One test study on seven products should not be enough to change all the third party verification and testing that has been previously done to establish water heater energy factors.

2nd Comment Period 09/03/2010 - 10/18/2010

EN4322-G6

Proponent	James York	Submitted	10/17/2010	Attachments	Yes

Comment:

See attached file for comments against code change proposal

2nd Comment Period 09/03/2010 - 10/18/2010

EN4322-G7

Proponent	Ron Marcelino	Submitted	10/18/2010	Attachments	No

Comment:

Rheem Manufacturing recommends the disapproval of this proposed modification for many reasons. First, this study was never made available for peer review and lacked consensus inputs from multiple gas Tankless manufacturers prior to the study. Second, the study was only based on a single Tankless manufacturer/model. In order to gain a better understanding of Tankless performance, a wider range of manufacturers and models should be included in the study. Not all Tankless products operate the same and a single model should not represent the Energy Factor (EF) for all Tankless products. For example, the model used in the study uses indoor combustion air. More energy is needed to heat and cool the home which will affect overall home efficiency. Other models such as a Direct Vent (DV) or Condensing model overcomes this issue. Also, the DV and Condensing models have higher efficiencies therefore should be given a better HERS factor. The test methodology used in the FSEC report is different than the Department of Energy (DOE) test protocol. The DOE protocol clearly states criteria related to modulating input rates, flow rates, draw patterns, and room temperatures. When comparing efficiencies, any deviation from these requirements would undermine the creditability of the DOE. As stated in the FSEC report, water quality could have also affected the efficiency results. Note that AHRI is also in the process of developing new test procedures for better assessing water heating efficiency. The reduced Energy Factors based on the FSEC study would be inappropriate at this time. We recommend that the existing DOE test method in determining Energy Factors should be used for Efficiency values.

2nd Comment Period 09/03/2010 - 10/18/2010

EN4322-G8

Proponent	Joseph Eysie	Submitted	10/18/2010	Attachments	Yes

Comment:

The following comment is the view of the Florida Natural Gas Association...

2nd Comment Period 09/03/2010 - 10/18/2010

EN4322-G9

Proponent	Jeff Sonne	Submitted	10/18/2010	Attachments	Yes

Comment:

Please see attached.

405.6.7 Installation criteria for homes claiming the dedicated heat pump option. The dedicated heat pump option may be used for a dedicated heat pump (also known as a heat pump water heater) installed either with a tank (an integral unit) or without tank (add on to another water heater) based on the COP of the system on which it is installed or energy factor (EF). No minimum rating is required for this equipment.

This modification request also includes a non-code text modification to the EnergyGauge USA FlaRes energy code compliance software that, where applicable, internally modifies water heater energy factors based on typical residential water draw profiles.

This comment is intended to provide further rationale for proposed code modification EN4322, and specifically address general comment EN4322-G1. The results reported in the FSEC "Side-by-Side Testing of Water Heating Systems Results from 2009-2010 Testing" publication are recommended as the basis for modifying the code water heater energy factors for a number of reasons:

1) More representative draw volume and inlet and setpoint water temperatures were used for the study (particularly compared to DOE testing)
2) The FSEC study has been peer reviewed and presented at the 2010 ACEEE Hot Water Forum
3) Other detailed research performed in California has shown the same results (see "Field and Laboratory Testing of Gas Tankless Water Heater Performance" by Marc Hoeschele and David Springer from the July 1, 2008 ASHRAE Transactions at: http://www.thefreelibrary.com/Field+and+laboratory+testing+of+gas+tankless+water+heater+performance-a0201378226)
4) The reality of the Hoeschele/Springer results is widely acknowledged by ASHRAE within its publications (see http://www.tiaxllc.com/publications/ashrae/december2009.pdf)
5) Simulation research at NREL has verified the same results: (see http://www.buildingscience.com/documents/reports/rr-1002-preliminary-modeling-testing-analysis-gas-tankless-water-heater)
6) The research has been duplicated elsewhere and is now part of the energy code in California (Title 24) where an 8.8% drop in the indicated energy factor for tankless gas water heaters is part of their current energy code (see http://www.energy.ca.gov/title24/2008standards/prerulemaking/documents/2006-05-18_workshop/2006-05-11_GAS_WATER.PDF).

The above provides full substantiation for modifying the "as performs" energy factor for tankless gas water heaters. We also propose the same kind of degradation for tankless electric, which is equally important.

There is no intention to usurp the authority of DOE to set the value for EF for water heaters for Energy Star, tax credits and the like. We are just saying that we are convinced that to get the energy accounting done properly to estimate realistic annual energy use and savings, we need to make the proposed adjustments in the calculations.

Code Modification #EN4322 Comments:

With regards to part 2 of the proposed modification to change the energy factors based on the FSEC study, there are concerns that the proposed reduction in tankless water heater efficiencies is not representative of other makes and models found in the market. The study conducted by FSEC has shown that water heaters in general can have lower efficiencies than their published values by altering the testing protocol. However, the study has failed to adequately look at how much efficiencies change across different models from different manufacturers. In a study conducted by Brookhaven National Laboratory in 2009-2010 as shown in Attachment 1, any change in the current Department of Energy test procedures will change the efficiency results; however the degree of change will depend highly on the model and product type. Therefore, anyone could create a test method that would be favorable to one technology while negatively impacting another. In addition, there currently exists in the market condensing technologies which have not been factored into this study and by design, have significantly higher efficiencies. These types of products would not be properly represented by the proposed reduction in efficiency ratings. Therefore, a straight across reduction should not be applied to all products based on the testing of only 1 sample but rather the existing Department of Energy test procedures for determining energy factor should still remain the basis for efficiency values until such time that a revised national standard is adopted.

Additional information regarding the Brookhaven National Laboratory study can be accessed at the following websites:

http://www.aceee.org/files/pdf/conferences/hwf/2010/3D_Ben_Schoenbauer.pdf

http://www.aceee.org/conferences/2010/hwf/program

In regards to the proposed modification to change energy factors based on the FSEC study I strongly recommend that this proposal be rejected for the following reasons. The FSEC study in general shows that water heaters in actual field use may not produce identical results to the rated EF. This has been demonstrated before in other studies where the draw patterns and daily hot water usage was altered with varying degrees of result. For example, when using large draw patterns storage water heaters will actually exceed their rated EF due to the reduced significance of the standby portion during the test.

To base reductions in EF for several water heater designs on the FSEC study would seem extremely premature especially since the study only tested on sample of each technology, electric storage water heater, electric tankless water heater, gas non-condensing storage water and gas non-condensing tankless water heater. How can one sample of an entire category of water heaters be considered indicative of the entire class? Gas tankless water heaters for example include electronic controls which allow for elaborate control logic and differ between manufacturers. These control algorithms can affect how fast the water heater starts up and provides water at the selected temperature and as the study indicates this start up time can affect the overall efficiency of the gas tankless water heater. This same example could easily be applied to the other technologies tested in this study since no storage water heaters with electronic controls were evaluated and only one manufacturer of each type of water heater was evaluated.

It is noted in the FSEC study that the gas tankless water heater had the largest drop in efficiency in September 2009 and did not recover to the higher efficiency level as the study returned to the original testing period. The study further indicates that "perhaps this outcome is due to the formation of scaling on the heat exchanger plates." No effort was made to determine if the unit had formed scale due to hard water conditions nor does the study mention what the water quality was at the test site. If the test site contained "hard water" then the results of this study are not true efficiencies under FSEC determined real world data but a test of how water heater efficiency degrades due to hard water and scale build up. This was demonstrated in the STUDY ON BENEFITS OF REMOVAL OF WATER HARDNESS (CALCIUM AND MAGNESIUM IONS) FROM A WATER SUPPLY By D. D. Paul, V.V. Gadkari, D.P. Evers, M.E. Goshe, and D.A. Thornton by Battelle.

This study as well as the Brookhaven National Laboratory Study by Ben Shoenbauer show significant energy savings for gas tankless water heaters over standard gas storage water heaters. The Shoenbauer study shows savings from 26% for high daily water usage to 41% for low water usage homes. The savings increase with condensing tankless water heaters to 47% to 56%. With demonstrated savings in multiple studies how can you justify any reduction in gas tankless water heaters without reducing the other technologies as well?

The proposal does not clearly identify how it is going to modify the water heater energy factors based on typical residential draw profiles. Does it plan to implement a flat number for all products of a certain category, for example are all gas tankless water heaters are now considered to have an EF of 0.71? How would this deal with new products as they are introduced on the market or even condensing tankless water heaters already on the market which have significantly higher EF's?

I would also like to mention that both ASHRAE and AHRI are both actively working to develop new test methods to better evaluate water heater efficiency and the new technologies that are emerging on the market. My recommendation would be to reject this proposal and allow the federal efficiency ratings to

remain in place which will always ensure that the building code is in sync with federal test method and ratings. This would also allow ASHRAE and AHRI to complete the development of the new test methods which are being developed with a much larger stakeholder group, multiple testing laboratories, products and manufacturers and will include peer review by multiple stake holders.

After a thorough review of Modification # EN 4322, we recommend that part 2 of this modification be omitted. Part 2 of EN 4322 drastically reduces the Energy Factor of Gas Tankless Water Heaters from .82 to .71, based on a study performed by FSEC titled *Side-by-Side Testing of Water Heater Systems*. The ensuing paragraphs consist of multiple concerns we have regarding part 2 of Modification # EN 4322.

Our first concern addresses the question as to whether or not it is reasonable to designate all gas tankless water heaters have their Energy Factor decreased from .82 to .71, based on the study of a single gas tankless water heater, from a single gas tankless manufacturer. We feel the FSEC study should have better addressed this concern by examining the differences between gas tankless water heaters models and manufacturers, and utilizing multiple gas tankless water heaters in their study.

Our second concern deals with the installation specifications pertaining to how the gas tankless water heater was installed during the FSEC Study. As depicted in Public Comment EN4322-G4, there are several problems regarding the piping, pressure, and regulator used in this study. We feel that all 3 of these problems (as depicted in Public Comment EN4322-G4) and the impacts of these problems could impact Energy Factor findings; should be individually addressed.

Our third concern is derived from the nature and scope of the study performed by FSEC. Any attempt to replace federal tankless water heater efficiency ratings should be done so within a much larger study, involve multiple testing laboratories, multiple manufacturers, and input from multiple stakeholders. Such a study should have the final test results supported by ASHREA, AHRI, and the DOE before any change in the Energy Factor of gas tankless water heaters is adopting into Florida Building Code.

Our 4th concern examines the impact this decrease in Energy Factor for gas tankless water heaters will have on PSC Approved Demand-Side Management programs of gas tankless water heaters. Currently, the cost effectiveness and cost-benefits analysis of gas tankless water heaters as a demand-side management energy conservation measure has been approved by the Public Service Commission in Docket Number 100186-EG. Has this issue been addressed by both Florida Building Code and Public Service Commission Staff?

Our 5th concern questions how the decrease in Energy Factor for gas tankless water heaters will impact the EnergyStar label that gas tankless waters have earned, and how the federal tax credit for gas tankless water heaters will be impacted. In Public Comment posting EN4322-G2, FSEC addresses this specific issue as they state that they have "*no intention to usurp the authority of the D.O.E. to set the value for Energy Factor for water heaters for EnergyStar, tax credits and the like. We are just saying that we are convinced that to get the energy accounting done properly to estimate realistic annual energy use and savings, we need to make the proposed adjustments in the calculations*". Although we commend FSEC for their efforts to determine realistic energy accounting of water heaters, we feel that decreasing the energy factor of gas tankless water heaters does in fact usurp the D.O.E.'s authority.

Lastly, although the FSEC study titled *Side-by-Side Testing of Water Heater Systems* was sponsored by the D.O.E. and the Building America Program, page of the report indicates that the flowing regarding the finding of the study; "This support does not constitute DOE endorsement of the views expressed in this *report*". We would like ask why the finding and conclusions of this study weren't endorsed by the DOE?

Responses and Corrections for the FSEC test report

I understand the valid concerns on items 1-3 mentioned in the submitted comment 4322-G4, but this might have been brought by a mistake in our report writing. The following sentence should be removed from our report:

"A fourteen i.w.c. pressure -reducing valve was installed at the service meter supplying the gas operating service typical for this region in Florida."

a) There is no 14 in.w.c. service anywhere in our setup. Our natural gas service is a 2 psi line directly reduced to 10 in. w.c. by each Maxitrol regulator to the natural gas heaters (tankless and 40 gal. tank). Our natural gas billing meter background plate color on the readout dial is RED, typical for a 2 psi service . -- (as opposed to meters for 14 in. w.c. service should have a White dial background plate as explained to me by the City Gas representative)

b) Based on the pipe size tables given to me by City Gas, a 2 psi 3/4" line (.60 sec gravity, 1 psi drop) should have a capacity (cfh) somewhere in between 836 and 751 for a line (3/4") 125 ft. and 150 ft. respectively. These values are from a table applicable to schedule 40 metallic pipe, but we have a polymer tubing which should have less wall friction if that helps any. As a check, a tankless water heater with 0.79 efficiency raising inlet water from say 70F to 122 F at 1.5 gpm should be consuming about 50,071 Btu/hr or an equivalent 49 cu. ft./hr .
Our other 40 gallon natural gas tank is rated at 36,000 Btu/hr. So clearly the line is sized correctly and can handle the gas supply at these testing conditions (Maximum capacity (average) ~793.5 cfh * 1020 Btu's/cf = 809,370 Btus/hr).

c) Our natural gas line (2 psi) service to each heater in the HWS have a 3/4" blue handle manual shut-off ball valves. It is generally true that "blue top" gas ball valves have a reduced port compared to red valves.
Based on manufacturer literature, the opening port on these blue valves is 0.6" diameter, but I 've also found other manufacturers valve with Red top gas ball valve (3/4") with a smaller diameter than blue valves (ex: A.Y. McDonald 10718 Red top Ball with 0.59"diameter port) -- as if the industry standards can also deviate from the norm. The pressure drop across the blue top valve (0.6" opening) at a rate of 49 cu. ft./hr would be so small (< 0.3 mbar or <0.004psi) that I don't think it has much implications in gas flow restrictions at the rates we are testing the tankless heater. If we were testing the tankless at higher flow rates and higher delta temperatures then it would be something to consider.

The tankless water heater front plate clearly states a maximum operating inlet gas pressure of 10.5 in. w.c. and minimum of 5.0 in. w. c., so the Maxitrol 325 pressure regulator is operating under a 2 psi service line as intended. The Maxitrol 325-5AL is a 2 psi to inches line regulator. The natural gas service is a 2 psi with a 3/4" size line between the gas billing meter and the HWS Lab (~140 ft. length). This line length under a 2 psi service can provide more than enough gas flow capacity for two water heaters. The Maxitrol pressure regulators (one per heater) reduce pressure to 10 in. w.c. as required by the appliances. The

Maxitrol 325-AL is operating as intended -- pounds at the inlet, regulating down to 10 in.w.c. at the outlet.

The person who replied had a valid argument if natural gas line was regulated to 14 in.w.c. at the service entrance over a 3/4" line, 140 feet in length. But the fact is we do not have that service arrangement. Again. it was a editing mistake in the report that will be corrected immediately.

I hope this clears the subject brought up about our service not being adequate for testing.

-Carlos Colon, Research Engineer, FSEC

EN4382

Date Submitted	4/2/2010	**Section**	405	**Proponent**	Jeff Sonne
Chapter	4	**Affects HVHZ**	No	**Attachments**	No

TAC Recommendation Approved as Submitted
Commission Action Pending Review

Related Modifications

None.

Summary of Modification

Relaxes the window area-weighed average maximum fenestration SHGC requirement for section 405 (performance) code compliance calculations in cases where the window area-weighted average overhang depth for the entire dwelling unit is 4.0 feet or greater.

Rationale

Porches provide shade for windows. Relaxing the SHGC requirement for performance compliance only for dwellings with large overhangs will help lower construction costs and typically increase visible light in these dwellings, preserving Florida vernacular architecture while still upholding energy performance.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

Minimal; in applicable cases, only if this option is chosen, will require verification that minimum weighted average overhang depth is met.

Impact to building and property owners relative to cost of compliance with code

Should lower compliance cost for qualifying dwelling units since SHGC requirements are relaxed.

Impact to industry relative to the cost of compliance with code

Minimal; in applicable cases, only if this option is chosen, will require a weighted average overhang depth calculation.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Provides builders of Florida vernacular architecture more choices of how to achieve code compliance.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Provides builders of Florida vernacular architecture more choices of how to achieve code compliance.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

Neutral; increases options in applicable cases.

Does not degrade the effectiveness of the code

Performance code must still be met.

2nd Comment Period 09/03/2010 - 10/18/2010

Proponent Arlene Stewart **Submitted** 10/17/2010 **Attachments** No

EN4382-G2

Comment:

TAC Action should be overturned as this language is not in the IECC and no Florida-specific climate related justification was included with the original submission. Concept and language should be submitted to the IECC as part of the ICC code development process.

1st Comment Period History 04/15/2010 - 06/01/2010

Proponent Eric Lacey **Submitted** 6/1/2010 **Attachments** No

EN4382-G1

Comment:

While we do not believe it is necessary, we believe that the approach in Mod 4382 is much more reasonable and consistent than other proposed mods that create exceptions to the SHGC requirement in favor of overhangs or other materials. This proposal keeps the overhang trade-off in the performance path only, where the correct measurements and calculations can take place. Although we do not recommend exceptions to the SHGC maximum requirement, if there must be an exception, it should be simple and limited to cases in which energy efficiency is likely to be ensured on a permanent basis.

There are also a few areas in which this proposal should be more precise. For example:

• The overhang depth and width should correspond to individual windows. While it may be simple to allow area-weighted averages, it is still important to ensure that overhangs provide appropriate shading over all windows.

• It is not clear how (or whether) this proposal applies to multiple-story buildings. If a four-foot overhang is reasonable for a single-story home, it may not provide sufficient shading for windows on both floors of a two-story home.

402.5 Maximum fenestration U-factor and SHGC (Mandatory). The area-weighted average maximum fenestration SHGC permitted using trade-offs from Section 405 shall be 0.50.

Exception: If the window area-weighted average overhang depth for the entire dwelling unit is 4.0 feet or greater, the area-weighted average maximum SHGC requirement of 0.50 does not need to be met.

EN4060

Date Submitted	3/29/2010	**Section**	502	**Proponent**	Mangesh Basarkar
Chapter	5	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation Approved as Submitted
Commission Action Pending Review

Related Modifications

Summary of Modification

Propose new envelope prescriptive requirements for alterations and renovations

Rationale

Roof, Wall and Raised Floor R-value change: The latest ASHRAE and IECC codes for commercial buildings have R-38 (roof) and R-19 (wall, raised floor) as the maximum recommended values. Also, during analysis conducted earlier, it was found that there are clearly diminishing returns for increasing R-value beyond this point for wall and roof envelope components.
SHGC: Very low SHGC values impede visible light transmittance (VLT) leading to curtailment of daylighting as viable energy saving measure.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

Proposed modification is not expected to impact local entities relative to code enforcement

Impact to building and property owners relative to cost of compliance with code

Proposed modification will not significantly impact property owners relative to cost of code compliance

Impact to industry relative to the cost of compliance with code

Proposed modifications is not expected to significantly impact industry relative to cost of code compliance

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Proposed modification has no substantial connection with the health, safety and welfare of the general public

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Proposed modification improves the code and provides alternatives to using complicated methods of compliance for relatively simple renovations and alterations

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

Proposed modification does not discriminate against any materials, products or system of construction

Does not degrade the effectiveness of the code

Proposed modification does not degrade the effectiveness of the code

2nd Comment Period 09/03/2010 - 10/18/2010

Proponent Arlene Stewart **Submitted** 10/18/2010 **Attachments** No

EN4060-G2

Comment:

TAC Action should be overturned since no data was submitted to support contention that proposed provision complied with legislative mandate for cost effective energy saving measures.

1st Comment Period History 04/15/2010 - 06/01/2010

Proponent Jack Glenn **Submitted** 6/1/2010 **Attachments** No

EN4060-G1

Comment:

Proponent indicates that language is in ‘latest ICC and ASHRAE”, but does not cite a code or edition. Are these the editions referenced in the code? Is it in the base IECC that we are integrating? How does ASHRAE interface with that?

Proposal:

Changes to prescriptive values in table 502.1.1.1(2) are proposed as follows:

TABLE 502.1.1.1 (2)

ENVELOPE PRESCRIPTIVE MEASURES

FOR RENOVATIONS AND ALTERATIONS[1]

Building Element	**Mandatory**
Roof:	
Absorptance	= 0.22
R-value (U-value)	~~R-40 (U=0.025)~~ R-38 (U= 0.033)
Exterior Wall:	
Above grade wall:	
Absorptance	=0.3
R-value (U-value)	~~R-30 (U=0.032)~~ R-19 (U= 0.032)
Below grade wall:	No requirement
Raised Floor Insulation	
R-value (U-value)	~~R-30 (U=0.032)~~ R-19 (U= 0.052)
Window:	
U-factor	= 0.45
SHGC (by window area)	
0-40% WW Ratio	0.25
>40 WW Ratio	~~0.19~~ 0.25
Skylights:	
SHGC	=0.19

Skylight U-value	=1.36
Opaque Door U-value	
Swinging	= U-0.7
Non-swinging	= U-1.45

Skylights:	
SHGC	=~~0.19~~ 0.35
Skylight U-~~value~~ factor	=~~1.36~~ 0.75

Date Submitted	3/22/2010	**Section**	503.2.3(10)	**Proponent**	Ann Stanton
Chapter	5	**Affects HVHZ**	No	**Attachments**	No

TAC Recommendation Approved as Submitted
Commission Action Pending Review

Related Modifications

3676

Summary of Modification

Add performance requirements for heat rejection equipment back into the code that were not included in the IECC.

Rationale

This table is currently in the energy code. It was left out of the code by oversight because it is not in the IECC. It also needs CTI STD-201 referenced per ASHRAE Addenda ak to 90.1-2004.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

None.

Impact to building and property owners relative to cost of compliance with code

None.

Impact to industry relative to the cost of compliance with code

None.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Yes.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Yes.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

No.

Does not degrade the effectiveness of the code

No.

2nd Comment Period 09/03/2010 - 10/18/2010

Proponent Arlene Stewart **Submitted** 10/18/2010 **Attachments** No

EN3675-G1

Comment:

TAC Action should be overturned as this language is not in the IECC and no Florida-specific climate related justification was included with the original submission. Concept and language should be submitted to the IECC as part of the ICC code development process.

TABLE 503.2.3(10)

Performance Requirements for Heat Rejection Equipment

Equipment Type	Total System Heat Rejection Capacity at Rated Conditions	Sub-Category or Rating Condition	Performance Required[1,2]	Test Procedure[3]
Propeller or Axial Fan Cooling Towers	All	95°F Entering Water 85°F Leaving Water 75°F wb Outdoor Air	=38.2 gpm/hp	CTI ATC-105 and CTI STD-201
Centrifugal Fan Cooling Towers	All	95°F Entering Water 85°F Leaving Water 75°F wb Outdoor Air	=20.0 gpm/hp	CTI ATC-105 and CTI STD-201
Air Cooled Condensers	All	125°F Condensing Temperature R-22 Test Fluid 190°F Entering Gas Temperature 15°F Subcooling 95°F Entering db	=176,000 Btu/hhp	AHRI 460

[1] For purposes of this table, cooling tower performance is defined as the maximum flow rating of the tower divided by the fan nameplate rated motor power.

[2] For purposes of this table, air-cooled condenser performance is defined as the heat rejected from the refrigerant divided by the fan nameplate rated motor power.

[3] Chapter 6 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

Date Submitted	3/22/2010	**Section**	503.2.3	**Proponent**	Ann Stanton
Chapter	5	**Affects HVHZ**	No	**Attachments**	No

TAC Recommendation Approved as Submitted
Commission Action Pending Review

Related Modifications

Summary of Modification

Add room air conditioners and room air conditioner heat pump requirements to Table 503.2.3(3).

Rationale

Did not notice that room units were not included in the IECC tables until after the text had gone through the Work Group. These requirements have been in the code for years.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

None. Replaces current requirements into the code.

Impact to building and property owners relative to cost of compliance with code

None.

Impact to industry relative to the cost of compliance with code

None.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Yes.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Returns criteria to the code omitted by oversight.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

No.

Does not degrade the effectiveness of the code

No.

2nd Comment Period 09/03/2010 - 10/18/2010

Proponent Arlene Stewart **Submitted** 10/18/2010 **Attachments** No

EN3673-G1

Comment:

TAC Action should be overturned as this language is not in the IECC and no Florida-specific climate related justification was included with the original submission. Concept and language should be submitted to the IECC as part of the ICC code development process.

TABLE 503.2.3(3) [in part]

Electrically Operated

Packaged Terminal Air Conditioners, Packaged Terminal Heat Pumps,

Single-Package Vertical Air Conditioners, Singe-Package Vertical Heat Pumps, Room Air Conditioners, and Room Air Conditioner Heat Pumps –

Minimum Efficiency Requirements

Equipment Type	Size Category	Subcategory or Rating Condition	Minimum Efficiency[1]	Test Procedure[2]
Room Air Conditioners with Louvered Sides	<6,000 Btu/h		9.7 SEER	ANSI/AHAM RAC-1
	=6,000<8,000 Btu/h		9.7 EER	
	>8,000<14,000Btu/h		9.8 EER	
	>14,000<20,000Btu/h		9.7 EER	
	>20,000 Btu/h		8.5 EER	
Room Air Conditioners, without Louvered Sides	<8,000 Btu/h		9.0 EER	
	>8,000 Btu/h and <20,000 Btu/h		8.5 EER	
Room Air Conditioner Heat Pumps with Louvered Sides	<20,000 Btu/h		9.0 EER	
	=20,000 Btu/h		8.5 EER	
Room Air Conditioner Heat Pumps without Louvered Sides	<14,000 Btu/h		8.5 EER	
	=14,000 Btu/h		8.0 EER	

Date Submitted	3/25/2010	**Section**	505.5.1.2.3	**Proponent**	Ann Stanton
Chapter	5	**Affects HVHZ**	No	**Attachments**	No

TAC Recommendation Approved as Submitted
Commission Action Pending Review

Related Modifications

Summary of Modification

Add Florida-specific criteria for calculating luminaire wattage. Correct from Addenda i to ASHRAE 90.1-04.

Rationale

These Florida-specific criteria for calculating the wattage to be included for code compliance were inadvertently not moved to the new base code. The proposed change provides a simplification to code.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

None. Clarifies code.

Impact to building and property owners relative to cost of compliance with code

None.

Impact to industry relative to the cost of compliance with code

Provides guidance on lighting wattage for code compliance compliance. No cost.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Yes. Provides for code clarity.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Yes, clarifies the code requirements.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

No.

Does not degrade the effectiveness of the code

No.

2nd Comment Period 09/03/2010 - 10/18/2010

Proponent Arlene Stewart **Submitted** 10/18/2010 **Attachments** No

EN3864-G1

Comment:

TAC Action should be overturned as this language is not in the IECC and no Florida-specific climate related justification was included with the original submission. Concept and language should be submitted to the IECC as part of the ICC code development process.

505.5.1.2.3 [B4.1.1] Luminaire Wattage. Luminaire wattage incorporated into the installed interior lighting power shall be determined in accordance with the following criteria:

1. The wattage of incandescent or tungsten-halogen luminaires with medium screw base sockets and not containing permanently installed ballasts shall be the maximum labeled wattage of the luminaire.

2. The wattage of luminaires with permanently installed or remote ballasts or transformers shall be the operating input wattage of the maximum lamp/ auxiliary combination based on values from the auxiliary manufacturer's literature or recognized testing laboratories or shall be the maximum labeled wattage of the luminaire.

3. The wattage of line-voltage lighting track and plug-in busway that allow the addition and/or relocation of luminaires without altering the wiring of the system shall be:

a. the specified wattage of the luminaries included in the system with a minimum of 30 watts per linear foot.

4. The wattage of low-voltage lighting track, cable conductor, rail conductor, and other flexible lighting systems that allow the addition and/or relocation of luminaires without altering the wiring of the system shall be the specified wattage of the transformer supplying the system.

5. The wattage of all other miscellaneous lighting equipment shall be the specified wattage of the lighting equipment.

Date Submitted	4/1/2010	**Section**	FL Std 2	**Proponent**	Jennifer Hatfield
Chapter	10	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation Approved as Submitted
Commission Action Pending Review

Related Modifications

Summary of Modification

Provides criteria on how to comply with section 403.9 of the FECC; parts of which are legislative directive. This document is the APSP-15 Draft Standard for Energy Efficiency for Residential Inground Swimming Pools & Spas that the FBC Energy Workgroup recommended for adoption into the 2010 code

Rationale

Proposed FL-2 of Appendix D of the FECC provides the necessary criteria to the manufacturers of pool products, pool contractors, and building departments on what is required to meet the pool heating and residential pool filtration pump requirements found in section 403.9 of the Florida Building Code, Energy Conservation Code and the 2008 energy bill (HB 7135).

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

It may take extra time for the AHJ to verify the products being installed meet these new energy efficiency requirements.

Impact to building and property owners relative to cost of compliance with code

These energy efficient products may increase the cost of the product to the owner upfront; however, a savings will ultimately occur with the owner's utility bill that should offset the increase associated with purchasing the product.

Impact to industry relative to the cost of compliance with code

These products may cost more to purchase; therefore, if the contractor does not pass on this increase in cost to the consumer then their profit margin will lessen.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

These energy efficient pool/spa products will lower the energy consumption of a pool/spa, benefiting the general public.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

This proposal strengthens and improves the code by requiring products, methods, and systems of construction that will result in energy savings.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

This proposal provides for a standard and method of compliance for products to follow. Products not meeting these new requirements will not be allowed to be installed.

Does not degrade the effectiveness of the code

This proposal does not degrade the effectiveness of the code; it actually strengthens and gives consistency throughout the State of Florida by providing guidance on how to meet the new energy efficiency requirements for pools and spas.

Alternate Language

2nd Comment Period 09/03/2010 - 10/18/2010

EN4072-A1

Proponent Jennifer Hatfield **Submitted** 10/18/2010 **Attachments** Yes

Rationale

APSP-15 has been updated and this comment provides those updates for FL-2.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

Same as original modification.

Impact to building and property owners relative to cost of compliance with code

Same as original modification.

Impact to industry relative to the cost of compliance with code

Same as original modification.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Same as original modification.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Same as original modification.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

Same as original modification.

Does not degrade the effectiveness of the code

Same as original modification.

APPENDIX D—FLORIDA STANDARDS

FLORIDA STANDARD NO. 2 (FL-2)

FLORIDA REGULATORY REQUIREMENTS FOR ENERGY EFFICIENCY FOR RESIDENTIAL INGROUND SWIMMING POOLS & SPAS

The following regulatory requirements shall constitute Florida Standard FL-2 and will provide compliance criteria for section 403.9 of the Florida Building Code, Energy Conservation Code. These requirements follow a draft national standard for energy efficiency for residential in-ground swimming pools and spas.

SECTION 1

SCOPE

1.1. Energy efficiency requirement for permanently installed residential swimming pool filtration and swimming pool and spa heating systems used for bathing and are operated by an owner. This standard is intended to cover certain aspects of the swimming pool filtration and heating system design, equipment, installation, and operation for the purpose of consuming less energy while maintaining water quality and temperature.

1.2. This standard does not cover swimming pool safety requirements, including, but not limited to, suction entrapment, structural, thermal, or electrical hazards.

1.3. This standard provides specifications for energy efficient filtration systems, but does not specify sanitizer, daily turnover flow rates, or pool-cleaning technologies needed to establish and maintain swimming pool water quality.

1.4. This standard provides specifications for energy efficient swimming pool and spa heating systems.

1.5. Other standards are referenced in this standard for items not covered.

SECTION 2

NORMATIVE REFERENCES

AHRI 1160, Standard For Performance Rating of Heat Pump Pool Heaters

APSP-4, Standard For Aboveground/Onground Residential Swimming Pools.[1]

APSP-5, Standard For Residential Inground Swimming Pools.[1]

APSP-7, Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins.[1]

HI 1.6, Centrifugal Pump Test.[2]

IEEE 114-2001, Standard Test Procedure for Single-Phase Induction Motors.[3]

NFPA 70, National electrical code, Article 680, Swimming pools, fountains, and similar installations.[4]

NSF 50, Equipment for Swimming Pools, Spas, Hot Tubs and Other Recreational Water Facilities.[5]

SECTION 3

DEFINITIONS

Auxiliary Pool Loads. Features, functions, or devices that need higher head and flow rates than that required for pool filtration, including, but not limited to, solar pool heating systems, filter backwashing, pool cleaners, waterfalls, fountains, and spas.

Backwash Valve. A diverter valve designed to reverse the flow of water through a filter. The valve is located between the circulation pump and the filter, including, but not limited to, slide, push-pull, multi-port, and full-flow valves.

Elbow (fittings). Also called ell, el. a plumbing pipe or pipe connection having a right-angled bend.

Filtration Flow Rate. A flow rate that will turn over the pool water volume in six hours or more (must be equal to or less than the maximum filtration flow rate).

Flow Rate. Flow rate is the volume of water flowing through the filtration system in a given time, usually measured in gallons per minute (gpm).

Head. The water pressure necessary to move fluid through pipes, and inlets, push water through filters and heaters, and project it through fountains and jets.

Maximum Filtration Flow Rate. The flow rate needed to turn over the pool water volume in six hours or 36 gpm, whichever is greater.

Maximum Flow Rate. The flow rate for the auxiliary pool loads or the filtration flow rate, whichever is greater.

Multi-Speed. A motor capable of operating at two (2) or more speeds and includes two-speed and variable-speed pumps.

Nameplate Horsepower. The nameplate power is the motor horsepower listed on the nameplate and the horsepower by which a pump is typically sold (also known as rated horsepower).

NSF/ANSI 50 is the NSF International (formerly National Sanitation Foundation) Standard and American National Standards Institute document entitled “Circulation System Components and Related Materials for Swimming Pools, Spas/Hot Tubs”

Pumps. Pool and spa pumps usually come with a leaf strainer before the impeller. The pumps contain an impeller to accelerate the water through the housing. The motors for residential pumps are included in the pump purchase but can be replaced separately. The pumps increase the “head” and “flow” of the water.

Permanently Installed Swimming Pool. A pool constructed in such a manner that it cannot be disassembled for storage.

Pipe and Pipe Fittings. The PVC pipe and fittings intended for use in the transport of swimming pool filtration water. Fittings include elbows, tees, and flow control valves. Pipe and fittings do not include

backwash valves, which are addressed separately, and equipment connections, or internal equipment piping.

Rated Horsepower.The motor power output designed by the manufacturer for a rated RPM, voltage and frequency. May be less than Total Horsepower where the Service Factor is > 1.0, or equal to Total Horsepower where the Service Factor = 1.0

Residential Swimming Pools. Permanently installed residential inground swimming pools intended for use by a single-family home for noncommercial purposes and with dimensions as defined in ANSI/NSPI-5.

Return. The return refers to the water in the filtration system returning to the pool. The return lines or return side, relative to the pump, can also be defined as the pressure lines or the pressure side of the pump. Water in the returns is delivered back to the pool at the pool inlets.

Service Factor. A multiplier applied to rated horsepower of a motor to indicate the percent above nameplate horsepower at which a pump motor may operate continuously without exceeding its allowable insulation class temperature limit, provided the other design parameters such a rated voltage, frequency and ambient temperature are within limits. Full-rated pool motor service factors can be as high as 1.65. A 1.5 hp pump with a 1.65 service factor produces 2.475 hp (total horsepower) at the maximum service factor point.

Service Factor Horsepower (SFHP). The maximum continuous duty motor power output rating allowable for nameplate ambient rating and motor insulation class. Commonly, service factor horsepower = rated horsepower x service factor (also known as total horsepower).

Suction. Suction created by the pump is how the pool water gets from the skimmers and suction outlets to the filtration system. The suction side and suction lines refer to the vacuum side of the pump. It is at negative atmospheric pressure relative to the pool surface.

Sweep Elbow. Sweep elbows or a type of elbow that has a pressure drop less than the pressure drop of straight pipe with a length of 30 pipe diameters. For example, a 2 inch elbow must have a pressure drop less than a 5-foot length of 2 inch straight pipe.

Total Dynamic Head. Total dynamic head, or TDH, refers to the sum of all the friction losses and pressure drops in the filtration system from the pools suction outlets and skimmers to the returns. It is a measure of the system's total pressure drop and is given in units of either psi or feet of water column (sometimes referred to as "feet" or "feet of head").

Total Horsepower. The product of the rated horsepower nameplate power and the service factor of a motor used on a pool pump.

Turnover. A turnover is the act of filtering one volume of the pool.

Turnover Time (also called Turnover Rate). The time required to circulate the entire volume of water in the pool or spa through the filter. e.g. A turnover time of 6-hours means an entire volume of water equal to that of the pool will be passed through a filter system in six hours.

Turnover Time = Volume of the pool / Flow rate

SECTION 4

APPLIANCES

4.1 Pool filter pumps

4.1.1 Motors

4.1.1.1 Motor efficiency
Pool filter pump motors shall not be split-phase, shaded-pole, or capacitor start – induction run type.

4.1.1.2 Two-speed, multi-speed, or variable-speed capability
Pool filter pump motors with a capacity of 1 total horsepower or greater shall have the capability of operating at two or more speeds with a low speed having a rotation rate that is no more than one-half of the motor's maximum rotation rate.

4.1.1.3 Test methods for pool filter pump motors

4.1.1.3.1 Reported motor efficiency shall be verifiable by test method IEEE 114-2001, or most recent version.

NOTE- Section 5.2.4.2.1 of IEEE 114-2001 lists formula for dynamometer correction factor. Formula inadvertently omits a component of the equation. Section 5.2.1.3.2 of the 1982 version of the standard lists formula correctly. Therefore, "corrected" shall mean using the 1982 version of the formula within the 2001 standard.

4.1.2 Pumps

4.1.2.1 Test methods for pool pumps
ANSI/HI 1.6-2000 shall be used for the measurement of pump efficiency.

4.1.2.1.1 Tests shall be conducted using unmodified, manufactured and fully assembled pump, including strainer baskets when applicable.

4.1.2.1.2 Three system curves shall be calculated:

Curve A: H = 0.0167 x F2 (Curve 2.0)
Curve B: H = 0.050 x F2 (Curve 1.5)
Curve C: H = 0.0082 x F2 (Curve 2.5)

Where:
H is the total system head in feet of water.
F is the flow rate in gallons per minute (gpm).

4.1.2.1.3 For each curve (A, B, or C), the pump head shall be adjusted until the flow and head lie on the curve. The following shall be tested and reported:

1. Motor nominal speed (RPM)
2. Flow (gallons per minute)
3. Power (watts)
4. Energy Factor (gallons per watt hour)

Where the Energy Factor (EF) is calculated as:

EF = Flow (gpm) * 60 / Power (watts)

4.1.2.1.4 For two-speed pumps, test and report each curve at both high and low speeds. For variable-speed pumps, test and report highest, lowest, and the best efficiency speed.

4.1.3 Labeling

4.1.3.1 Motors
Each pool filter pump motor shall be marked, permanently and legibly on an accessible and conspicuous place on the unit, in characters no less than ¼", the capacity of the motor.

4.1.3.2 Pumps
Each pool filter pump shall be marked, permanently and legibly on an accessible and conspicuous place on the unit, in characters no less than ¼", the nameplate horsepower of the pump.

4.1.3.3 Two-speed, multi-speed, or variable-speed pool filter pumps shall be marked permanently and legibly on an accessible and conspicuous place on the unit, in characters no less than ¼", "This pump must be installed with a two-, multi-, or variable-speed pump motor controller."

4.2 Pump controllers

4.2.1 Pool pump motor controls for use with a two-speed, multi-speed, or variable-speed pumps shall have the capability of operating the pool pump at least at two speeds. The control's default filtration speed setting shall be no more than one-half of the motor's maximum rotation rate. Any high-speed override capability shall be for a temporary period not to exceed one 24-hour cycle without resetting to default settings.

4.3 Heaters

4.3.1 Energy design

4.3.1.1 Gas-fired pool heaters shall not be equipped with constant burning pilots.

4.3.1.2 All pool heaters shall have a readily accessible on-off switch that is mounted on the outside of the heater and that allows shutting off the heater without adjusting the thermostat setting.

4.3.1.3 Electric resistance hearing is prohibited.

4.3.2 Heater efficiency

4.3.2.1 Gas-fired pool heaters and oil-fired pool heaters shall have a thermal efficiency of not less than 78 percent.

4.3.2.2 There is no energy efficiency standard for electric resistance pool heaters.

4.3.2.3 Electric heat pump pool heaters shall have a coefficient of performance (COP) of not less than 4.0 at the low temperature conditions when tested in accordance with AHRI Standard 1160.

4.3.3 Test methods

4.3.3.1 ANSI Z21.56 – 1994 shall be used for the measurement of gas-fired and oil-fired pool heater efficiency.

4.3.3.2 ANSI/ASHRAE 146-1998 shall be used for the measurement of electric resistance pool heater efficiency.

4.3.3.3 ARI 1160 - 2008, Table 2, Standard Rating Conditions – Low Air Temperature, shall be used for the measurement of heat pump pool heater efficiency.

ARI 1160 – 2008: Table 2. Standard Rating Conditions

	Air Temperature Surrounding Unit		Water Temperature Entering Unit	Water Flow Rate (or Less if Specified by the Manufacturer)	
	Dry-bulb °F [°C]	Wet-bulb °F [°C]	°F [°C]	GPM	L/s
High Air Temperature -Mid Humidity (62% RH)	80.6 [27.0]	70.7 [21.5]	80.0 [26.7]	0.450 per 1000 Btu/h	0.028 per 293.1 Watts
Low Air Temperature -Mid Humidity (63% RH)	50.0 [10.0]	44.2 [6.78]	80.0 [26.7]	Same flow rate as established in High Air Temperature - Mid Humidity (62% RH)	

To comply with this standard, measured test results for Heating Capacity and Coefficient of Performance shall not be less than 95% of Published Ratings

SECTION 5

POOL SYSTEMS

5.1 General

5.1.1 All filter pumps and filter pump motors installed shall be listed in the California Energy Commission's Appliance Efficiency Database for Residential Pool Pumps, or the APSP Appliance Efficiency Pool Pump Database and shall comply with Section 4.1.

5.1.2 For maximum energy efficiency, pool filtration should be operated at the lowest possible flow rate for a time period that provides sufficient water turnover for clarity and sanitation.

5.1.3 For maximum hydraulic efficiency, sweep elbows or elbow-type fittings that have a pressure drop of less than the pressure drop of straight pipe with a length of 30 pipe diameters are recommended.

5.1.4 Auxiliary pool loads that require high flow rates such as spas, pool cleaners, and water features, should be operated separately from the filtration system to allow the maximum flow rate to be kept to a minimum.

5.1.5 Pool controls are a critical element of energy efficient pool design. Modern pool controls allow for auxiliary loads such as cleaning systems, solar heating, and temporary water features without compromising energy savings.

5.2 Maximum filtration flow rate

5.2.1 Depending on the size (volume) of the pool, the pool filtration flow rate may not be greater than the rate needed to turn over the pool water volume in six hours or 36 gpm,

whichever is greater. This means that for pools of less than 13,000 gallons the pump must be sized to have a flow rate of 36 gpm or less and for pools of greater than 13,000 gallons, the pump must be sized using the following equation:

Maximum Filtration Flow Rate (gpm) = Pool Volume (gallons) / 360

5.2.2 These are maximum flow rates. Lower filtration flow rates and longer filtration times are encouraged and will result in added energy savings.

5.2.3 Pools with auxiliary pool loads must use either a multi-speed pump or a separate pump for each auxiliary pool load. For example, if a spa shares the pool filtration system, either a multi-speed pump must be used or a separate pump must be provided to operate the spa. If the pool system can be served by one pump of less than 1 total horsepower in capacity, the pump may be single speed.

5.3 Pool filter pump sizing, flow rate, and filter pump control.

5.3.1 Filtration pump motors with a capacity of 1 total horsepower or more shall be multi-speed.

5.3.2 For pools equal to or less than 17,000 gallons, a filter pump must be chosen such that the flow rate listed for Curve A is less than the maximum filtration flow rate calculated according to Section 5.2.1 (six-hour turnover rate).

5.3.3 For pools greater than 17,000 gallons, a filter pump must be chosen such that the listed flow rate at Curve C is less than the maximum filtration flow rate calculated according to Section 5.2.1 (six-hour turnover rate).

5.3.3.1 The pool filter pump head and flow rate shall be calculated using the following system equation:

H = C X F2

Where:

H is the total system head in feet of water.

F is the maximum filtration flow rate in gallons per minute (gpm).

C is a coefficient based on the volume of the pool:

0.0167 for pools less than or equal to 17,000 gallons.

0.0082 for pools greater than 17,000 gallons.

and;

5.3.4 Filtration pumps shall be sized, or if programmable, shall be programmed, so that the filtration flow rate is not greater than the rate needed to turn over the pool water volume in 6 hours or 36 gpm, whichever is greater; and

5.3.5 Pump motors used for filtration with a capacity of 1 total horsepower or more shall be multi-speed; and

5.3.6 Each auxiliary pool load shall be served by either separate pumps or the system shall be served by a multi-speed pump; and

EXCEPTION: Filter pumps if less than 1 total horsepower may be single speed.

5.3.7 Multi-speed pumps must have controls that default to the filtration flow rate when no auxiliary pool loads are operating. The controls must also default to the filtration flow rate setting within 24 hours and must have a temporary override capability for servicing.

5.3.8 A time switch or similar control mechanism must be installed as part of the pool water filtration control system that will allow all pumps to be set or programmed to run only during the off-peak electric demand period and for the minimum time necessary to maintain the water in the condition required by applicable public health standards.

5.4 System equipment

5.4.1 Filters sizing.
Filters shall be at least the size specified in NSF/ANSI 50 for public pool intended applications based on the maximum flow rate through the filter.

5.4.1.1 The filter factors that must be used are (in ft^2/gpm):

- Cartridge 0.375
- Sand 15
- Diatomaceous Earth 2

5.4.2 Backwash valves.
Minimum diameter of backwash valves shall be 2 inches or the diameter of the return pipe, whichever is greater.

5.5 System piping and circulation.

5.5.1 Pool piping and pipe fittings shall be sized so that the velocity of the water at the maximum flow rate does not exceed 8 feet per second in the return line and 6 feet per second in the suction line. Velocity calculations for branch piping flow shall allow variations in pipe sizes.

EXCEPTION: Equipment connections and internal piping, including, but not limited to, suction safety systems, pumps, heaters, and sanitizing devices.

JPG Picture should be here, would not insert, but is in support file document.

Figure 1

5.5.2 Solar heating. At least 18 inches of horizontal or vertical pipe shall be installed between the filter and the heater or dedicated suction and return lines, or built-in or built-up connections shall be installed to allow for the future addition of solar heating equipment.

5.6 Directional inlets.
The pool shall have directional inlets that adequately mix the pool water.

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[1] Association of Pool and Spa Professionals (APSP) [formerly National Spa and Pool Institute (NSPI)], 2111 Eisenhower Avenue, Alexandria, VA 22314

[2] Hydraulic Institute, 6 Campus Drive, First Floor North, Parsippany NJ, 07054-4406, (973) 267-9700, *www.pumps.org*

[3] IEEE Corporate Office, 3 dark Avenue, 17th Floor, New York, NY 10016-5997, (212) 419-7900, *www.ieee.org*

[4] National Fire Protection Association (NFPA) 1 Batterymarch Park, Quincy, MA 02169-7471, (617) 770-3000, *www.nfpa.org*

[5] NSF International, 789 Dixboro Road, Ann Arbor, MI 48113-0140, (734) 769-8010, *www.nsf.org*

See attached file for updated version of FL-2 (APSP-15 Standard) with tracked changes.

APPENDIX D – FLORIDA STANDARDS

FLORIDA STANDARD NO. 2 (FL-2)

FLORIDA REGULATORY REQUIREMENTS FOR ENERGY EFFICIENCY FOR RESIDENTIAL INGROUND SWIMMING POOLS & ~~INGROUND~~ SPAS

The following regulatory requirements shall constitute Florida Standard FL-2 and will provide compliance criteria for section 403.9 of the *Florida Building Code, Energy Conservation Code*. These requirements follow an Association of Pool & Spa Professional (APSP) ~~draft~~ national standard for energy efficiency for residential in-ground swimming pools and spas.

1. Scope

1.1. Energy efficiency requirement for permanently installed residential aboveground/onground and inground swimming pool filtration and permanently installed swimming pool and spa heating systems used for bathing and are operated by an owner. This standard is intended to cover certain aspects of the swimming pool filtration and heating system design, equipment, installation, and operation for the purpose of consuming less energy while maintaining water quality and temperature.

1.2. This standard does not cover swimming pool safety requirements, including, but not limited to, suction entrapment, structural, thermal, or electrical hazards.

1.3. This standard does not cover Portable Electric Spas, which are covered by APSP-14 Standard for Portable Electric Spa Energy Efficiency.

1.4. This standard provides specifications for energy efficient filtration systems, but does not specify sanitizer, daily turnover flow rates, or pool-cleaning technologies needed to establish and maintain swimming pool water quality.

~~1.2.~~1.5. This standard provides specifications for energy efficient, permanently installed residential aboveground/onground and inground swimming pool and spa heating systems.

~~1.3.~~1.6. Other standards are referenced in this standard for items not covered.

2. Normative references

AHRI 1160, Standard For Performance Rating of Heat Pump Pool Heaters

APSP-4, Standard For Aboveground/Onground Residential Swimming Pools.[1]

APSP-5, Standard For Residential Inground Swimming Pools.[1]

[1] Association of Pool and Spa Professionals (APSP) [formerly National Spa and Pool Institute (NSPI)], 2111 Eisenhower Avenue, Alexandria, VA 22314

APSP-7, Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins.[1]

HI 1.6, Centrifugal Pump Test.[2]

IEEE 114-2001, Standard Test Procedure for Single-Phase Induction Motors.[3]

NFPA 70, National electrical code, Article 680, Swimming pools, fountains, and similar installations.[4]

NSF 50, Equipment for Swimming Pools, Spas, Hot Tubes and Other Recreational Water Facilities.[5]

3. Definitions

Auxiliary Pool Loads. Features, functions, or devices that need higher head and/or flow rates than that required for pool filtration, including, but not limited to, solar pool heating systems, filter backwashing, pool cleaners, waterfalls, fountains, and spas.

Backwash Valve. A diverter valve designed to reverse the flow of water through a filter. The valve is located between the circulation pump and the filter, including, but not limited to, slide, push-pull, multi-port, and full-flow valves.

Brake Horsepower. A term historically used in the pool, spa, and whirlpool bath industries, a term which conflicts with Total Horsepower and Service Factor Horsepower, and if used would not conform to this standard.

Capacity of the Motor. The Total Horsepower, or product of the rated horsepower and the service factor of a motor used on a pool pump (also known as SFHP) based on the maximum continuous duty motor power output rating allowable for nameplate ambient rating and motor insulation class.

Elbow (fittings). Also called ell, el. a plumbing pipe or pipe connection having a right-angled bend.

Energy Factor. The measure of overall pool filter pump efficiency in units of gallons per watt-hour, as determined using the applicable test method in Section 4.1.2. Energy Factor is analogous to other energy factors such as Miles Per Gallon. Energy Factor (EF) is calculated as:

[2] Hydraulic Institute, 6 Campus Drive, First Floor North, Parsippany NJ, 07054-4406, (973) 267-9700, *www.pumps.org*
[3] IEEE Corporate Office, 3 dark Avenue, 17th Floor, New York, NY 10016-5997, (212) 419-7900, *www.ieee.org*
[4] National Fire Protection Association (NFPA) 1 Batterymarch Park, Quincy, MA 02169-7471, (617) 770-3000, *www.nfpa.org*
[5] NSF International, 789 Dixboro Road, Ann Arbor, MI 48113-0140, (734) 769-8010, *www.nsf.org*

EF (gal/Wh) = Flow (gpm) x 60 / Power (watts)

Filtration Flow Rate. ~~The~~ A flow rate ~~needed to~~that will turn over the pool water volume in six hours or ~~36 gpm, whichever is greate~~morer (must be equal to or less than the maximum filtration flow rate).

Flow Rate. Flow rate is the volume of water flowing through the filtration system in a given time, usually measured in gallons per minute (gpm).

Full-Rated. A term used to describe pool pump motors with a Service Factor greater than 1.25 (typically). The term is generally used for marketing purposes and is not used within the scope this standard.

Head. The water pressure necessary to move fluid through pipes, and inlets, push water through filters, ~~and~~ heaters, and other equipment, and project it through fountains and jets.

Maximum Filtration Flow Rate. The flow rate needed to turn over the pool water volume in six hours or 36 gpm, whichever is greater.

Maximum Flow Rate. The flow rate for the auxiliary pool loads or the filtration flow rate, whichever is greater.

Max-Rated. A term used to describe pool pump motors with a Service Factor between 1.0 and 1.25 (typically). The term is generally used for marketing purposes and is not within the scope this standard.

Multi-Speed. A pump motor capable of operating at two (2) or more speeds and includes two-speed, three-speed, and variable-speed.

Nameplate ~~Power~~Horsepower. The ~~nameplate power is the~~ motor horsepower listed on the ~~nameplate~~ pump and the horsepower by which a pump is typically sold (also known as rated horsepower).

NSF/ANSI 50 is the NSF International Standard and American National Standards Institute document entitled "Circulation System Components and Related Materials for Swimming Pools, Spas/Hot Tubs"

Peak Horsepower. A term historically used in the pool, spa, and whirlpool bath industries, a term which conflicts with Total Horsepower and Service Factor Horsepower, and if used would not conform to this standard.

Permanently Installed Swimming Pool. A pool constructed in such a manner that it cannot be disassembled for storage.

Pipe and Pipe Fittings. The PVC pipe and fittings intended for use in the transport of swimming pool filtration water. Fittings include elbows, tees, and flow control

valves. Pipe and fittings do not include backwash valves, which are addressed separately, and equipment connections, or internal equipment piping.

Pool Pump Motor Capacity. See Total Horsepower.

Pumps. Pool and spa pumps usually come with a leaf strainer before the impeller. The pumps contain an impeller to accelerate the water through the housing. The motors for residential ~~us~~ pumps are included in the pump purchase but can be replaced separately. The pumps increase the "head" and "flow" of the water.

Rated Horsepower. The motor power output designed by the manufacturer for a rated RPM, voltage and frequency. May be less than Total Horsepower where the Service Factor is > 1.0, or equal to Total Horsepower where the Service Factor = 1.0

Residential Swimming Pools. Permanently installed residential inground and aboveground/onground swimming pools intended for use by a single-family home for noncommercial purposes and with dimensions as defined in ANSI/NSPI-5 Standard for Residential Inground Swimming Pools and ANSI/APSP-4 2007 Standard for Aboveground/Onground Residential Swimming Pools.

Return. The return refers to the water in the filtration system returning to the pool. The return lines or return side, relative to the pump, can also be defined as the pressure lines or the pressure side of the pump. Water in the returns is delivered back to the pool at the pool inlets.

Service Factor. ~~The service factor rating~~A multiplier applied to rated horsepower of a motor to indicate~~s~~ the percent above nameplate horsepower at which a pump motor may operate continuously without exceeding its allowable insulation class temperature limit, provided the other design parameters such a rated voltage, frequency and ambient temperature are within limits.~~when full-rated voltage is applied and ambient temperature does not exceed the motor rating. Full-rated pool motor service factors can be as high as 1.65.~~ A 1.5 hp pump with a 1.65 service factor produces 2.475 hp (total ~~hp~~horsepower) at the maximum service factor point.

Service Factor Horsepower (SFHP). The maximum continuous duty motor power output rating allowable for nameplate ambient rating and motor insulation class. Commonly, service factor horsepower = rated horsepower x service factor (also known as total horsepower).

Special Horsepower. A term historically used in the pool, spa, and whirlpool bath industries, a term which may conflict with Rated Horsepower, Total Horsepower and Service Factor Horsepower, and if used would not conform to this standard.

Suction. Suction created by the pump is how the pool water gets from the skimmers and ~~drains~~ suction outlets to the filtration system. The suction side and suction lines refer to the vacuum side of the pump. It is at negative atmospheric pressure relative to the pool surface.

System Curve. A graphical representation of the relationship between Flow Rate and Total Dynamic Head, where TDH increases proportional to the square of the flow and plotting the relationship results in a parabolic shape. Each system will have a unique curve with the starting point, (zero flow) being the same for all systems. The generic expression for a system curve is $H = C \times F^2$, where H = Total Dynamic Head, C = is a coefficient based on the resistance of the system, and F = flow rate. As TDH increases, for example, as the filter collects debris and system pressure increases, coefficient C will also increase.

Sweep Elbow. Sweep elbows or a type of elbow that has a pressure drop less than the pressure drop of straight pipe with a length of 30 pipe diameters. For example, a 2 inch elbow must have a pressure drop less than a 5-foot length of 2 inch straight pipe.

Total Dynamic Head. Total dynamic head, or TDH, refers to the sum of all the friction losses and pressure drops in the filtration system from the pool's ~~drains~~ suction outlets and skimmers to the returns. It is a measure of the system's total pressure drop and is given in units of either psi or feet of water column (sometimes referred to as "feet," ~~or~~ "feet of head," or "head").

Total Horsepower~~Motor Power~~. ~~Total motor power, or T-hp, refers to t~~The product of the rated horsepower ~~nameplate power~~ and the service factor of a motor used on a pool pump (also known as SFHP) based on the maximum continuous duty motor power output rating allowable for nameplate ambient rating and motor insulation class.

Total Horsepower = Rated Horsepower x Service Factor.

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Turnover. A turnover is the act of filtering one volume of water in the pool.

Turnover Time (also called Turnover Rate). The time required to circulate the entire volume of water in the pool or spa through the filter. e.g. A turnover time of 6-hours means an entire volume of water equal to that of the pool will be passed through a filter system in six hours.

Turnover Time = Volume of the pool / Flow rate

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Up-Rated. A term used to describe pool pump motors with a Service Factor between 1.0 and 1.25 (typically). The term is generally used for marketing purposes and is not within the scope this standard.

4. Appliances

4.1. Pool filter pumps

4.1.1. Motors

4.1.1.1 Motor efficiency
Pool filter pump motors shall not be split-phase, shaded-pole, or capacitor start – induction run type.

EXCEPTION: Pool pump motors that are powered exclusively from on-site renewable generation. For example: solar photovoltaic and wind generation. Grid-tied generation systems are not exempt since the pump is powered from the traditional utility grid when the alternate power source is not available.

4.1.1.2 Two-speed, multi-speed, or variable-speed capability
Pool filter pump motors with a capacity of 1.0 total horsepower or greater shall have the capability of operating at two or more speeds with a low speed having a rotation rate that is no more than one-half of the motor's maximum rotation rate.

4.1.1.3Test methods for pool filter pump motors

4.1.1.3.1 Reported motor efficiency shall be verifiable by test method IEEE 114-2001 (corrected), or most recent version.

NOTE- Section 5.2.4.2.1 of IEEE 114-2001 lists formula for dynamometer correction factor. Formula inadvertently omits a component of the equation. Section 5.2.1.3.2 of the 1982 version of the standard lists formula correctly. Therefore, "corrected" shall mean using the 1982 version of the formula within the 2001 standard.

4.1.2. Pumps

4.1.2.1. Test methods for pool pumps

4.1.2.1.1. ANSI/HI 1.6-2000 shall be used for the measurement of pump performance and efficiency.

~~4.1.2.1.1.~~4.1.2.1.2. Tests shall be conducted using unmodified, manufactured and fully assembled pump, including strainer baskets when applicable.

~~4.1.2.1.2.~~4.1.2.1.3. Three system curves shall be calculated:

Curve A: H = 0.0167 x F^2 (~~Curve~~ approximately 2.0" pipe)

Curve B: H = 0.050 x F^2 (~~Curve~~approximately 1.5" pipe)

Curve C: H = 0.0082 x F^2 (~~Curve~~ approximately 2.5" pipe)

Where:

H is the total system head in feet of water.

F is the flow rate in gallons per minute (gpm).

~~4.1.2.1.3.~~4.1.2.1.4. For each curve (A, B, ~~or~~ and C), the pump head shall be adjusted until the flow and head lie on the curve. The following shall be tested and reported for the intersect point of the pump performance curve with each system curve:

1. Motor nominal speed (RPM)
2. Flow (gallons per minute)
3. Power (watts)
4. Energy Factor (gallons per watt hour)

Where the Energy Factor (EF) is calculated as:

EF = Flow (gpm) ~~*~~ x 60 / Power (watts)

4.1.2.1.5. For two-speed, three-speed, or other multi-speed pumps with fixed, non-adjustable speeds, test and report the intersect point of the pump performance curve with each system curve. Intersect data required in Section 4.1.2.1.4 shall be reported for each ~~at both high and low~~ speed and each system curve ~~s~~.

~~4.1.2.1.4.~~4.1.2.1.6. For variable-speed pumps, test and report the intersect point of the pump performance curve with each system curve. Intersect data required in Section 4.1.2.1.4 shall be reported for the highest, lowest, and the best efficiency speed~~s~~ as determined by the manufacturer.

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4.1.3. Labeling

4.1.3.1. Motors

Each pool filter pump motor shall be marked, permanently and legibly on an accessible and conspicuous place on the unit, in characters no less than ¼", the ~~capacity~~ Total Horsepower of the motor.

4.1.3.2. Pumps

Each pool filter pump shall be marked, permanently and legibly on an

accessible and conspicuous place on the unit, in characters no less than ¼", the ~~n~~Nameplate ~~HP~~ Horsepower of the pump.

4.1.3.3. Two-speed, multi-speed, or variable-speed pool filter pumps shall be marked permanently and legibly on an accessible and conspicuous place on the unit, in characters no less than ¼", "This pump, when used as a filter pump, must be installed with a two-, multi-, or variable-speed pump motor controller."

EXCEPTION: Pool filter pumps with integrated and/or included timer and motor control without which the motor will not run and which comply with Section 4.2.1.

4.2. **Pump controllers**

4.2.1 Pool pump motor controls for use with a two-speed, multi-speed, or variable-speed pumps shall have the capability of operating the pool pump at least at two speeds. The control's default filtration speed setting shall be no more than one-half of the motor's maximum rotation rate. Any high-speed override capability shall be for a temporary period not to exceed one 24-hour cycle without resetting to default settings.

4.3. **Heaters**

4.3.1. **Energy design**

4.3.1.1. Gas-fired pool heaters shall not be equipped with constant burning pilots.

4.3.1.2. All pool heaters shall have a readily accessible on-off switch that is mounted on the outside of the heater and that allows shutting off the heater without adjusting the thermostat setting.

4.3.1.3. Electric resistance heating is prohibited.

4.3.2. **Heater efficiency**

4.3.2.1. Gas-fired pool heaters and oil-fired pool heaters shall have a thermal efficiency of not less than 78 percent for heaters manufactured before April 16, 2013 and not less than 82 percent for heaters manufactured on or after April 16, 2013.

4.3.2.2. There is no energy efficiency standard for electric resistance pool heaters.

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4.3.2.3. Electric ~~H~~heat pump pool heaters shall have a coefficient of performance (COP) ~~at low temperature~~ of not less than 4.0 at the low temperature conditions when tested in accordance with AHRI Standard 1160.

4.3.3. Test methods

4.3.3.1. ANSI Z21.56 – 1994 shall be used for the measurement of gas-fired and oil-fired pool heater efficiency.

4.3.3.2. ANSI/ASHRAE 146-1998 shall be used for the measurement of electric resistance pool heater efficiency.

4.3.3.3. AHRI 1160 - 2008, Table 2, Standard Rating Conditions – Low Air Temperature, shall be used for the measurement of heat pump pool heater efficiency.

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AHRI 1160 – 2008: Table 2. Standard Rating Conditions					
-	Air Temperature Surrounding Unit		Water Temperature Entering Unit	Water Flow Rate (or Less if Specified by the Manufacturer)	
-	Dry-bulb °F [°C]	Wet-bulb °F [°C]	°F [°C]	GPM	L/s
High Air Temperature -Mid Humidity (62% RH)	80.6 [27.0]	70.7 [21.5]	80.0 [26.7]	0.450 per 1000 Btu/h	0.028 per 293.1 Watts
Low Air Temperature -Mid Humidity (63% RH)	50.0 [10.0]	44.2 [6.78]	80.0 [26.7]	Same flow rate as established in High Air Temperature - Mid Humidity (62% RH)	

To comply with this standard, measured test results for Heating Capacity and Coefficient of Performance shall not be less than 95% of Published Ratings

5. Pool systems

5.1. General

5.1.1. All filter pumps and filter pump motors installed shall be listed in the California Energy Commission's Appliance Efficiency Database for Residential Pool Pumps, or the APSP Appliance Efficiency Pool Pump Database and shall comply with Section 4.1.

5.1.2. For maximum energy efficiency, pool filtration should be operated at the lowest possible flow rate for a time period that provides sufficient water turnover for clarity and sanitation.

5.1.3. For maximum hydraulic efficiency, sweep elbows or elbow-type fittings that have a pressure drop of less than the pressure drop of straight pipe with a length of 30 pipe diameters are recommended.

~~5.1.2.~~**5.1.4.** Auxiliary pool loads that require high flow rates such as spas, pool cleaners, and water features, should be operated separately from the filtration system to allow the maximum filtration flow rate to be kept to a minimum.

~~5.1.3.~~**5.1.5.** Pool controls are a critical element of energy efficient pool design. Modern pool controls allow for auxiliary loads such as cleaning systems,

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solar heating, and temporary water features without compromising energy savings.

5.2. Maximum filtration flow rate

5.2.1. Depending on the size (volume) of the pool, the pool filtration flow rate may not be greater than the rate needed to turn over the pool water volume in six hours or 36 gpm, whichever is greater. This means that for pools of less than 13,000 gallons the pump must be sized to have a flow rate of ~~less than~~ 36 gpm or less and for pools of greater than 13,000 gallons, the pump must be sized using the following equation:

Maximum Filtration Flow Rate (gpm) = Pool Volume (gallons) / 360

5.2.2. These are maximum flow rates. Lower filtration flow rates and longer filtration times are encouraged and will result in added energy savings.

5.2.3. Pools with auxiliary pool loads must use either a multi-speed pump or a separate pump for each auxiliary pool load. For example, if a spa shares the pool filtration system, either a multi-speed pump must be used or a separate pump must be provided to operate the spa. If the pool system can be served by one pump of less than 1.0 total horsepower in capacity, the pump may be single speed.

5.3. Pool filter pump sizing, flow rate, and filter pump control.

5.3.1. Filtration pump motors with a capacity of 1.0 total horsepower or more shall be multi-speed.

5.3.2. Select a pool filtration pump from the California Energy Commission's Appliance Efficiency Database for Residential Pool Pumps, or the APSP Appliance Efficiency Pool Pump Database.

5.3.2.1. For pools equal to or less than 17,000 gallons, a filter pump shall be chosen such that the flow rate listed for Curve A is less than the maximum filtration flow rate calculated according to Section 5.2.1 (six-hour turnover rate). For multi-speed and variable-speed filter pumps, at least one speed shall have the flow listed for Curve A that is less than the maximum filtration flow rate calculated according to Section 5.2.1 (six-hour turnover rate).

~~5.3.1.1.~~5.3.2.2. For pools greater than 17,000 gallons, a filter pump shall be chosen such that the listed flow rate at Curve C is less than the maximum filtration flow rate calculated according to Section 5.2.1 (six-hour turnover rate). For multi-speed and variable-speed filter pumps, at least one speed shall have the flow listed for Curve C that is less than the maximum filtration flow rate calculated according to Section

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5.2.1 (six-hour turnover rate).

~~5.3.2.~~5.3.3. The maximum filter pump performance limits in Sections 5.3.2.1 and 5.3.2.2 are calculated based on pool gallons, where the filter pump performance increases proportional to the size of the pool. In the same way, pipe, filter and backwash valve (when used) will increase in size proportional to pool volume.

5.3.4. System equation used by pool filter pump manufacturers:

$H = C \times F^2$

Where:

H is the total system head in feet of water.

F is the Maximum Filtration Flow Rate in gallons per minute (gpm) calculated according to Section 5.2.1 (six-hour turnover rate).

C is a coefficient based on the volume of the pool:

C = 0.0167 for pools less than or equal to 17,000 gallons.

C = 0.0082 for pools greater than 17,000 gallons.

~~5.3.3. Filtration pumps shall be sized, or if programmable, shall be programmed, so that the filtration flow rate is not greater than the rate needed to turn over the pool water volume in 6 hours or 36 gpm, whichever is greater; and~~

~~5.3.4. Pump motors used for filtration with a capacity of 1 total horsepower or more shall be multi-speed; and~~

~~5.3.5. Each auxiliary pool load shall be served by either separate pumps or the system shall be served by a multi-speed pump; and~~

~~**EXCEPTION:** Filter pumps if less than 1 total horsepower may be single speed.~~

~~5.3.6.~~5.3.5. Multi-speed pumps must have controls that default to the filtration flow rate when no auxiliary pool loads are operating. The controls must also default to the filtration flow rate setting within 24 hours and must have a temporary override capability for servicing.

~~5.3.7.~~5.3.6. A time switch or similar control mechanism must be installed as part of the pool water filtration control system that will allow all pumps to be set or programmed to run only during the off-peak electric demand period and for the minimum time necessary to maintain the water in the condition required by applicable public health standards.

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EXCEPTION: Pool filter pumps with integrated and/or included timer and motor control without which the motor will not run and which comply with Section 4.2.1.

5.4. System equipment

5.4.1. Filters sizing.
Filters shall be at least the size specified in NSF/ANSI 50 for public pool intended applications based on the maximum flow rate through the filter.

5.4.1.1. The filter factors that must be used are ~~(in gpm/ft^2)~~:

- Cartridge 0.375 (gpm/ft^2) ~~(ft^2)~~
- Sand 15 (gpm/ft^2) ~~(ft^2)~~
- Diatomaceous Earth 2 (gpm/ft^2) ~~(ft^2)~~

5.4.2. Backwash valves.
Minimum diameter of backwash valves shall be 2 inches or the diameter of the return pipe, whichever is greater.

5.5. System piping and circulation.

5.5.1. Pool piping and pipe fittings shall be sized so that the velocity of the water at the maximum flow rate does not exceed 8 feet per second in the return line and 6 feet per second in the suction line.

EXCEPTION: Equipment connections and internal piping, including, but not limited to, suction safety systems, pumps, heaters, and sanitizing~~ers~~ devices.

5.5.1.1. Velocity calculations for branch piping flow shall allow variations in pipe sizes provided there are no valves capable of isolating flow through one branch. Branch piping is shown as the thin line in Figure 1.

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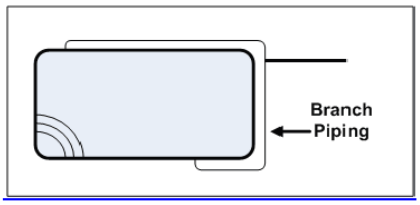

Figure 1

~~5.5.1.~~5.5.2. For pool filtration pumps without an integrated strainer basket, a length of straight pipe that is at least 4 pipe diameters shall be installed before the pump.

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~~5.5.2.~~5.5.3. Solar heating.

At least 18 inches of horizontal or vertical pipe shall be installed between the filter and the heater or dedicated suction and return lines, or built-in or built-up connections shall be installed to allow for the future addition of solar heating equipment.

5.6. **Directional inlets.**
The pool shall have directional inlets that adequately mix the pool water.

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The Global Source and Voice for the Recreational Water Industry

APSP-15 Standard for Energy Efficiency for Residential Inground Swimming Pools and Spas

1. Scope

1.1. Energy efficiency requirement for permanently installed residential swimming pool filtration and swimming pool and spa heating systems used for bathing and are operated by an owner. This standard is intended to cover certain aspects of the swimming pool filtration and heating system design, equipment, installation, and operation for the purpose of consuming less energy while maintaining water quality and temperature.

1.2. This standard does not cover swimming pool safety requirements, including, but not limited to, suction entrapment, structural, thermal, or electrical hazards.

1.3. This standard provides specifications for energy efficient filtration systems, but does not specify sanitizer, daily turnover flow rates, or pool-cleaning technologies needed to establish and maintain swimming pool water quality.

1.4. This standard provides specifications for energy efficient swimming pool and spa heating systems.

1.5. Other standards are referenced in this standard for items not covered.

2. Normative references

AHRI 1160, *Standard For Performance Rating of Heat Pump Pool Heaters*

APSP-4, *Standard For Aboveground/Onground Residential Swimming Pools.*[1]

APSP-5, *Standard For Residential Inground Swimming Pools.*[1]

APSP-7, *Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins.*[1]

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[1] Association of Pool and Spa Professionals (APSP) [formerly National Spa and Pool Institute (NSPI)], 2111 Eisenhower Avenue, Alexandria, VA 22314

HI 1.6, *Centrifugal Pump Test.*[2]

IEEE 114-2001, *Standard Test Procedure for Single-Phase Induction Motors.*[3]

NFPA 70, *National electrical code, Article 680, Swimming pools, fountains, and similar installations.*[4]

NSF 50, *Equipment for Swimming Pools, Spas, Hot Tubes and Other Recreational Water Facilities.*[5]

3. Definitions

Auxiliary Pool Loads. Features, functions, or devices that need higher head and flow rates than that required for pool filtration, including, but not limited to, solar pool heating systems, filter backwashing, pool cleaners, waterfalls, fountains, and spas.

Backwash Valve. A diverter valve designed to reverse the flow of water through a filter. The valve is located between the circulation pump and the filter, including, but not limited to, slide, push-pull, multi-port, and full-flow valves.

Elbow (fittings). Also called ell, el. a plumbing pipe or pipe connection having a right-angled bend.

Filtration Flow Rate**.** A flow rate that will turn over the pool water volume in six hours or more (must be equal to or less than the maximum filtration flow rate).

Flow Rate. Flow rate is the volume of water flowing through the filtration system in a given time, usually measured in gallons per minute (gpm).

Head. The water pressure necessary to move fluid through pipes, and inlets, push water through filters and heaters, and project it through fountains and jets.

Maximum Filtration Flow Rate. The flow rate needed to turn over the pool water volume in six hours or 36 gpm, whichever is greater.

Maximum Flow Rate. The flow rate for the auxiliary pool loads or the filtration flow rate, whichever is greater.

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[2] Hydraulic Institute, 6 Campus Drive, First Floor North, Parsippany NJ, 07054-4406, (973) 267-9700, *www.pumps.org*

[3] IEEE Corporate Office, 3 dark Avenue, 17th Floor, New York, NY 10016-5997, (212) 419-7900, *www.ieee.org*

[4] National Fire Protection Association (NFPA) 1 Batterymarch Park, Quincy, MA 02169-7471, (617) 770-3000, *www.nfpa.org*

[5] NSF International, 789 Dixboro Road, Ann Arbor, MI 48113-0140, (734) 769-8010, *www.nsf.org*

Multi-Speed. A motor capable of operating at two (2) or more speeds and includes two-speed and variable-speed pumps.

Nameplate Horsepower. The nameplate power is the motor horsepower listed on the nameplate and the horsepower by which a pump is typically sold (also known as rated horsepower).

NSF/ANSI 50 is the NSF International (formerly National Sanitation Foundation) Standard and American National Standards Institute document entitled "Circulation System Components and Related Materials for Swimming Pools, Spas/Hot Tubs"

Pumps. Pool and spa pumps usually come with a leaf strainer before the impeller. The pumps contain an impeller to accelerate the water through the housing. The motors for residential pumps are included in the pump purchase but can be replaced separately. The pumps increase the "head" and "flow" of the water.

Permanently Installed Swimming Pool. A pool constructed in such a manner that it cannot be disassembled for storage.

Pipe and Pipe Fittings. The PVC pipe and fittings intended for use in the transport of swimming pool filtration water. Fittings include elbows, tees, and flow control valves. Pipe and fittings do not include backwash valves, which are addressed separately, and equipment connections, or internal equipment piping.

Rated Horsepower. The motor power output designed by the manufacturer for a rated RPM, voltage and frequency. May be less than Total Horsepower where the Service Factor is > 1.0, or equal to Total Horsepower where the Service Factor = 1.0

Residential Swimming Pools. Permanently installed residential inground swimming pools intended for use by a single-family home for noncommercial purposes and with dimensions as defined in ANSI/NSPI-5.

Return. The return refers to the water in the filtration system returning to the pool. The return lines or return side, relative to the pump, can also be defined as the pressure lines or the pressure side of the pump. Water in the returns is delivered back to the pool at the pool inlets.

Service Factor. A multiplier applied to rated horsepower of a motor to indicate the percent above nameplate horsepower at which a pump motor may operate continuously without exceeding its allowable insulation class temperature limit, provided the other design parameters such a rated voltage, frequency and ambient temperature are within limits. Full-rated pool motor service factors can be as high as 1.65. A 1.5 hp pump with a 1.65 service factor produces 2.475 hp (total horsepower) at the maximum service factor point.

Service Factor Horsepower (SFHP). The maximum continuous duty motor power output rating allowable for nameplate ambient rating and motor insulation class. Commonly, service factor horsepower = rated horsepower x service factor (also known as total horsepower).

Suction. Suction created by the pump is how the pool water gets from the skimmers and suction outlets to the filtration system. The suction side and suction lines refer to the vacuum side of the pump. It is at negative atmospheric pressure relative to the pool surface.

Sweep Elbow. Sweep elbows or a type of elbow that has a pressure drop less than the pressure drop of straight pipe with a length of 30 pipe diameters. For example, a 2 inch elbow must have a pressure drop less than a 5-foot length of 2 inch straight pipe.

Total Dynamic Head. Total dynamic head, or TDH, refers to the sum of all the friction losses and pressure drops in the filtration system from the pools suction outlets and skimmers to the returns. It is a measure of the system's total pressure drop and is given in units of either psi or feet of water column (sometimes referred to as "feet" or "feet of head").

Total Horsepower. The product of the rated horsepower nameplate power and the service factor of a motor used on a pool pump.

Turnover. A turnover is the act of filtering one volume of the pool.

Turnover Time (also called Turnover Rate). The time required to circulate the entire volume of water in the pool or spa through the filter. e.g. A turnover time of 6-hours means an entire volume of water equal to that of the pool will be passed through a filter system in six hours.

Turnover Time = Volume of the pool / Flow rate

4. Appliances

4.1. Pool filter pumps

4.1.1. Motors

4.1.1.1. Motor efficiency
Pool filter pump motors shall not be split-phase, shaded-pole, or capacitor start – induction run type.

4.1.1.2. Two-speed, multi-speed, or variable-speed capability
Pool filter pump motors with a capacity of 1 total horsepower or greater shall have the capability of operating at two or more speeds with a low speed having a rotation rate that is no more than one-half of the motor's maximum rotation rate.

4.1.1.3. Test methods for pool filter pump motors

4.1.1.3.1. Reported motor efficiency shall be verifiable by test method IEEE 114-2001, or most recent version.

NOTE- Section 5.2.4.2.1 of IEEE 114-2001 lists formula for dynamometer correction factor. Formula inadvertently omits a component of the equation. Section 5.2.1.3.2 of the 1982 version of the

standard lists formula correctly. Therefore, "corrected" shall mean using the 1982 version of the formula within the 2001 standard.

4.1.2. Pumps

4.1.2.1. Test methods for pool pumps

ANSI/HI 1.6-2000 shall be used for the measurement of pump efficiency.

4.1.2.1.1. Tests shall be conducted using unmodified, manufactured and fully assembled pump, including strainer baskets when applicable.

4.1.2.1.2. Three system curves shall be calculated:

Curve A: H = 0.0167 x F2 (Curve 2.0)

Curve B: H = 0.050 x F2 (Curve 1.5)

Curve C: H = 0.0082 x F2 (Curve 2.5)

Where:

H is the total system head in feet of water.

F is the flow rate in gallons per minute (gpm).

4.1.2.1.3. For each curve (A, B, or C), the pump head shall be adjusted until the flow and head lie on the curve. The following shall be tested and reported:

1. Motor nominal speed (RPM)
2. Flow (gallons per minute)
3. Power (watts)
4. Energy Factor (gallons per watt hour)

Where the Energy Factor (EF) is calculated as:

EF = Flow (gpm) * 60 / Power (watts)

4.1.2.1.4. For two-speed pumps, test and report each curve at both high and low speeds. For variable-speed pumps, test and report highest, lowest, and the best efficiency speed.

4.1.3. Labeling

4.1.3.1. Motors

Each pool filter pump motor shall be marked, permanently and legibly on an accessible and conspicuous place on the unit, in characters no less than ¼", the capacity of the motor.

4.1.3.2. Pumps

Each pool filter pump shall be marked, permanently and legibly on an

accessible and conspicuous place on the unit, in characters no less than ¼", the nameplate horsepower of the pump.

4.1.3.3. Two-speed, multi-speed, or variable-speed pool filter pumps shall be marked permanently and legibly on an accessible and conspicuous place on the unit, in characters no less than ¼", "This pump must be installed with a two-, multi-, or variable-speed pump motor controller."

4.2. **Pump controllers**

4.2.1 Pool pump motor controls for use with a two-speed, multi-speed, or variable-speed pumps shall have the capability of operating the pool pump at least at two speeds. The control's default filtration speed setting shall be no more than one-half of the motor's maximum rotation rate. Any high-speed override capability shall be for a temporary period not to exceed one 24-hour cycle without resetting to default settings.

4.3. Heaters

4.3.1. Energy design

4.3.1.1. Gas-fired pool heaters shall not be equipped with constant burning pilots.

4.3.1.2. All pool heaters shall have a readily accessible on-off switch that is mounted on the outside of the heater and that allows shutting off the heater without adjusting the thermostat setting.

4.3.1.3. Electric resistance heating is prohibited.

Comment: APSP-15 draft language was removed and replaced with the FBC Energy Workgroup recommended language.

Deleted: No electric resistance heating except for listed package units that has fully insulated enclosures and tight fitting covers that are insulated to at least R-6. Or if documentation is provided that at least 60 % of the annual heating energy is from site solar energy or recovered energy.

4.3.2. Heater efficiency

4.3.2.1. Gas-fired pool heaters and oil-fired pool heaters shall have a thermal efficiency of not less than xx percent. [TBD pending DOE* rule-making as it applies to pool heaters]. * Department of Energy 10 CFR Part 430 Energy Conservation Program: Energy Conservation Standards for Residential Water Heaters, Direct Heating Equipment, and Pool Heaters; Proposed Rule

4.3.2.2. There is no energy efficiency standard for electric resistance pool heaters.

4.3.2.3. Electric heat pump pool heaters shall have a coefficient of performance (COP) of not less than 4.0 at the low temperature conditions when tested in accordance with AHRI Standard 1160.

4.3.3. Test methods

4.3.3.1. ANSI Z21.56 – 1994 shall be used for the measurement of gas-fired and oil-fired pool heater efficiency.

4.3.3.2. ANSI/ASHRAE 146-1998 shall be used for the measurement of electric resistance pool heater efficiency.

4.3.3.3. ARI 1160 - 2008, Table 2, Standard Rating Conditions – Low Air Temperature, shall be used for the measurement of heat pump pool heater efficiency.

ARI 1160 – 2008: Table 2. Standard Rating Conditions

	Air Temperature Surrounding Unit		Water Temperature Entering Unit	Water Flow Rate (or Less if Specified by the Manufacturer)	
	Dry-bulb °F [°C]	Wet-bulb °F [°C]	°F [°C]	GPM	L/s
High Air Temperature -Mid Humidity (62% RH)	80.6 [27.0]	70.7 [21.5]	80.0 [26.7]	0.450 per 1000 Btu/h	0.028 per 293.1 Watts
Low Air Temperature -Mid Humidity (63% RH)	50.0 [10.0]	44.2 [6.78]	80.0 [26.7]	Same flow rate as established in High Air Temperature - Mid Humidity (62% RH)	

To comply with this standard, measured test results for Heating Capacity and Coefficient of Performance shall not be less than 95% of Published Ratings

5. Pool systems

5.1. General

5.1.1. All filter pumps and filter pump motors installed shall be listed in the California Energy Commission's Appliance Efficiency Database for Residential Pool Pumps, or the APSP Appliance Efficiency Pool Pump Database and shall comply with Section 4.1.

5.1.2. For maximum energy efficiency, pool filtration should be operated at the lowest possible flow rate for a time period that provides sufficient water turnover for clarity and sanitation.

5.1.3. For maximum hydraulic efficiency, sweep elbows or elbow-type fittings that have a pressure drop of less than the pressure drop of straight pipe with a length of 30 pipe diameters are recommended.

5.1.4. Auxiliary pool loads that require high flow rates such as spas, pool cleaners, and water features, should be operated separately from the filtration system to allow the maximum flow rate to be kept to a minimum.

5.1.5. Pool controls are a critical element of energy efficient pool design. Modern pool controls allow for auxiliary loads such as cleaning systems, solar heating, and temporary water features without compromising energy savings.

5.2. Maximum filtration flow rate

5.2.1. Depending on the size (volume) of the pool, the pool filtration flow rate may not be greater than the rate needed to turn over the pool water volume in six hours or 36 gpm, whichever is greater. This means that for pools of less than 13,000 gallons the pump must be sized to have a flow rate of 36 gpm or less and for pools of greater than 13,000 gallons, the pump must be sized using the following equation:

Maximum Filtration Flow Rate (gpm) = Pool Volume (gallons) / 360

5.2.2. These are maximum flow rates. Lower filtration flow rates and longer filtration times are encouraged and will result in added energy savings.

5.2.3. Pools with auxiliary pool loads must use either a multi-speed pump or a separate pump for each auxiliary pool load. For example, if a spa shares the pool filtration system, either a multi-speed pump must be used or a separate pump must be provided to operate the spa. If the pool system can be served by one pump of less than 1 total horsepower in capacity, the pump may be single speed.

5.3. Pool filter pump sizing, flow rate, and filter pump control.

5.3.1. Filtration pump motors with a capacity of 1 total horsepower or more shall be multi-speed.

5.3.2. For pools equal to or less than 17,000 gallons, a filter pump must be chosen such that the flow rate listed for Curve A is less than the maximum filtration flow rate calculated according to Section 5.2.1 (six-hour turnover rate).

5.3.3. For pools greater than 17,000 gallons, a filter pump must be chosen such that the listed flow rate at Curve C is less than the maximum filtration flow rate calculated according to Section 5.2.1 (six-hour turnover rate).

5.3.3.1. The pool filter pump head and flow rate shall be calculated using the following system equation:

H = C X F2

Where:

H is the total system head in feet of water.

F is the Maximum Filtration Flow Rate in gallons per minute (gpm).

C is a coefficient based on the volume of the pool:

0.0167 for pools less than or equal to 17,000 gallons.

0.0082 for pools greater than 17,000 gallons.

and;

5.3.4. Filtration pumps shall be sized, or if programmable, shall be programmed, so that the filtration flow rate is not greater than the rate needed to turn over the pool water volume in 6 hours or 36 gpm, whichever is greater; and

5.3.5. Pump motors used for filtration with a capacity of 1 total horsepower or more shall be multi-speed; and

5.3.6. Each auxiliary pool load shall be served by either separate pumps or the system shall be served by a multi-speed pump; and

EXCEPTION: Filter pumps if less than 1 total horsepower may be single speed.

5.3.7. Multi-speed pumps must have controls that default to the filtration flow rate when no auxiliary pool loads are operating. The controls must also default to the filtration flow rate setting within 24 hours and must have a temporary override capability for servicing.

5.3.8. A time switch or similar control mechanism must be installed as part of the pool water filtration control system that will allow all pumps to be set or programmed to run only during the off-peak electric demand period and for the minimum time necessary to maintain the water in the condition required by applicable public health standards.

5.4. System equipment

5.4.1. Filters sizing.
Filters shall be at least the size specified in NSF/ANSI 50 for public pool intended applications based on the maximum flow rate through the filter.

5.4.1.1. The filter factors that must be used are (in ft^2/gpm):

- Cartridge 0.375
- Sand 15
- Diatomaceous Earth 2

5.4.2. Backwash valves.
Minimum diameter of backwash valves shall be 2 inches or the diameter of the return pipe, whichever is greater.

5.5. System piping and circulation.

5.5.1. Pool piping and pipe fittings shall be sized so that the velocity of the water at the maximum flow rate does not exceed 8 feet per second in the return line and 6 feet per second in the suction line. Velocity calculations for branch piping flow shall allow variations in pipe sizes.

EXCEPTION: Equipment connections and internal piping, including, but not limited to, suction safety systems, pumps, heaters, and sanitizing devices.

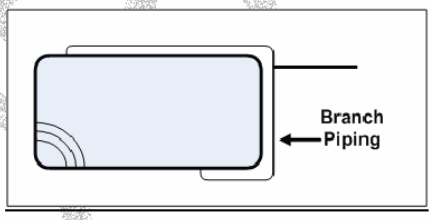


Figure 1

5.5.2. Solar heating.

At least 18 inches of horizontal or vertical pipe shall be installed between the filter and the heater or dedicated suction and return lines, or built-in or built-up connections shall be installed to allow for the future addition of solar heating equipment.

Comment: The APSP-15 straight pipe requirement was removed per FBC Energy Workgroup recommendation.

Deleted: A length of straight pipe that is at least 4 pipe diameters shall be installed before the pump

5.6. **Directional inlets.**
The pool shall have directional inlets that adequately mix the pool water.

Sub Code: Building

Date Submitted	4/2/2010	**Section**	New appendix	**Proponent**	Doug Harvey
Chapter	2711	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation No Affirmative Recommendation with a Second

Commission Action Pending Review

Related Modifications

Add code reference to chapter 35 including the edition date.

Summary of Modification

Add a new Appendix “XX” (Designation to be assigned)

Rationale

Please see support document for rationale.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

This proposed change does not impact local enforcement, it merely provides an alternate path for design that adhere to the Florida Building Code

Impact to building and property owners relative to cost of compliance with code

No fiscal impact to the building owner is anticipated

Impact to industry relative to the cost of compliance with code

No fiscal impact to the industry is anticipated

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

This proposed change protects the health, safety and welfare by allowing the code compliant use of “green” ideas and technologies

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

This proposed change improves the code for design consistency

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

This proposed code change does not discriminate

Does not degrade the effectiveness of the code

This proposed change does not degrade the effectiveness of the code.

2nd Comment Period 09/03/2010 - 10/18/2010

EN4391-G3

Proponent Arlene Stewart **Submitted** 10/18/2010 **Attachments** No

Comment:

TAC action should be reconsidered. Reason for disapproval was that the code was not yet final. However, the IGCC is available at http://www.iccsafe.org/cs/IGCC/Pages/default.aspx?r=IGCC. It is listed as the public version and not listed as a draft.

2nd Comment Period 09/03/2010 - 10/18/2010

EN4391-G4

Proponent Thomas Allen **Submitted** 10/18/2010 **Attachments** No

Comment:

Support: IGCC to be included in the Florida Building Code in an appendix.
An appendix is adopted locally
This would provide an easily adopted green code that is designed to work with the building code

1st Comment Period History 04/15/2010 - 06/01/2010

EN4391-G1

Proponent Doug Harvey **Submitted** 6/1/2010 **Attachments** No

Comment:

BOAF has suggested the International Green Construction Code (IGCC) be included as an adoptable appendix. While many ideas for “green” and green construction are present in the marketplace today, no other document has been through the process the IgCC has. This document has been compared to the base codes for Building, Mechanical, Plumbing, Fuel Gas and Energy. The code has been scrutinized so as to prevent conflicts between building code requirements and green/sustainable requirements. The IgCC has been evaluated and endorsed by the USGBC and ASHRAE as well through the national consensus process. Many areas are in the process of trying to adopt “green” standards for their communities. This will provide a method for jurisdictions looking to mandate greener and more sustainable requirements. In addition, this document was created in conjunction with ASHRAE, ICC and others, including public meetings, to ensure compatibility with many of the existing requirements in existence today and with a forward looking approach. While this is a relatively new document, inclusion as an adoptable appendix will offer an option that will help with code compliance, not code violation or putting different standards at odds with each other.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4391-G2

Proponent Jack Glenn **Submitted** 6/1/2010 **Attachments** No

Comment:

The new appendix is based on a proposed standard that is not yet approved.

APPENDIX 'XX' (Designation to be assigned)

International Green Construction Code (IGCC)

The provisions in this appendix are not mandatory unless specifically referenced in the adopting ordinance

SECTION (XX) 101

GENERAL

(XX) 101.1 Scope. The provisions of this appendix are applicable to all occupancies covered by the International Green Construction Code (IGCC).

(XX) 101.2 Intent. The intent of this appendix is to provide direction for communities having a desire to preserve natural resources, especially water, and lessen the impact of construction on the built environment. Adoption of this standard is to safeguard the environment, public health, safety and general welfare through the establishment of requirements to reduce the negative potential impacts and increase the potential positive impacts of the built environment and building occupants, by means of minimum requirements to: conservation of natural resources, materials and energy; the employment of renewable energy technologies, indoor and outdoor air quality; and building operations and maintenance.

(XX) 101.3 Requirements. The design of buildings shall be in accordance with the International Green Construction Code (IGCC).

Add the Following to Chapter 35 – references:

ICC

International Code Council, Inc.

500 New Jersey Avenue, NW

6th Floor

Washington, DC 20001

Standard Referenced: IGCC

Title: **International Green Construction Code (IGCC)**

Reference in code section number: Appendix L

Date Submitted	April 2, 2010
Mod Number	
Code Version	2010
Code Change Cycle	2010 Triennial Original Modifications 03/01/2010/-/04/02/2010
Sub-code	Building
Chapter Topic	Appendix, International Green Construction Code
Section	Appendix
Related Modification	Add code reference to chapter 35 including the edition date.
Affects HVHZ	No
Summary of modification	Add a new Appendix "XX" (Designation to be assigned)
Text of Modification	APPENDIX 'XX' (Designation to be assigned) International Green Construction Code (IGCC) The provisions in this appendix are not mandatory unless specifically referenced in the adopting ordinance SECTION (XX) 101 GENERAL (XX) 101.1 Scope. The provisions of this appendix are applicable to all occupancies covered by the International Green Construction Code (IGCC). (XX) 101.2 Intent. The intent of this appendix is to provide direction for communities having a desire to preserve natural resources, especially water, and lessen the impact of construction on the built environment. Adoption of this standard is to safeguard the environment, public health, safety and general welfare through the establishment of requirements to reduce the negative potential impacts and increase the potential positive impacts of the built environment and building occupants, by means of minimum requirements to: conservation of natural resources, materials and energy; the employment of renewable energy technologies, indoor and outdoor air quality; and building operations and maintenance. (XX) 101.3 Requirements. The design of buildings shall be in accordance with the International Green Construction Code (IGCC). Add the Following to Chapter 35 – references: ICC International Code Council, Inc.

	500 New Jersey Avenue, NW 6th Floor Washington, DC 20001 Standard Referenced: IGCC Title: International Green Construction Code (IGCC) Reference in code section number: Appendix L
Rational	1. The purpose of this proposed change is to add a new optional appendix to the FBC. 2. The proposed appendix will reference the International Green Construction Code (IGCC). This newly-developed, consensus-based standard may be used in conjunction with local code requirements specific to green buildings covered in the scope. 3. Green buildings are currently being designed and constructed nationwide using different programs guidelines, rating systems, and standards. The IGCC was developed under the direction of ICC, in conjunction with representatives from other nationally-recognized organizations with experience and expertise in this field, including ASHRAE members. In many cases, limited guidance is given as to the criteria to be used to determine if the building project meets the expectations. The IGCC provides a path using a publicly-reviewed resource for local jurisdictions to adopt and use in the administration of green residential building design.
Fiscal Impact statement	
Impact to Local Enforcement	This proposed change does not impact local enforcement, it merely provides an alternate path for design that adhere to the Florida Building Code
Impact to Building owner	No fiscal impact to the building owner is anticipated
Impact to Industry	No fiscal impact to the industry is anticipated
Requirements	
Has connection to health safety and Welfare	This proposed change protects the health, safety and welfare by allowing the code compliant use of “green” ideas and technologies
Strengths or improves Code	This proposed change improves the code for design consistency
Does not discriminate	This proposed change does not discriminate
Does not degrade effectiveness of code	This proposed change does not degrade the effectiveness of the code.

Sub Code: Energy Conservation

Date Submitted	4/1/2010	**Section**	Definitions	**Proponent**	Amanda Hickman
Chapter	2	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation No Affirmative Recommendation with a Second

Commission Action Pending Review

Related Modifications

Mod 4309 - adds new section (402.3.2) - compliance paths to meeting SHGC requirements in Table 402.1.1.

Summary of Modification

Add permanent shading to chapter 2 definitions

Rationale

This is a companion change to our modification 4309 on the requirements for permanent shading. The definition clarifies the intent of the modification and indicates what categories of products and devices would be in code compliance.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

This definition is a companion change to our modification to section 402.3.2 on “Permanent Shading” sees the fiscal impact statement on modification 4309.

Impact to building and property owners relative to cost of compliance with code

This definition is a companion change to our modification to section 402.3.2 on “Permanent Shading” see the fiscal impact statement on modification 4309.

Impact to industry relative to the cost of compliance with code

This definition is a companion change to our modification to section 402.3.2 on “Permanent Shading” see the fiscal impact statement on modification 4309.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

This definition is a companion change to our modification to section 402.3.2 on “Permanent Shading” see the statement on modification 4309.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

This definition is a companion change to our modification to section 402.3.2on “Permanent Shading” see the statement on modification 4309.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

This definition is a companion change to our modification to section 402.3.2 on “Permanent Shading” see the statement on modification 4309.

Does not degrade the effectiveness of the code

This definition is a companion change to our modification to section 402.3.2 on “Permanent Shading” see the statement on modification 4309.

2nd Comment Period 09/03/2010 - 10/18/2010

EN4307-G7

Proponent	Amanda Hickman	**Submitted**	10/18/2010	**Attachments**	Yes

Comment:

The Building Code Act of 2008 (HB 697) requires that energy efficiency performance goals be achieved through elements such as “shading devices, sunscreening materials, and overhangs.” This proposal is in line with that directive and we respectfully request that the TAC take a second look at the proposed language. Please see the attached rationale document.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4307-G1

Proponent	Brian Sernulka	**Submitted**	6/1/2010	**Attachments**	No

Comment:

BCAP believes that the Florida Building Code should be efficient, simple, and enforceable. Any trade-offs or exceptions to code requirements should be narrowly defined so that energy efficiency is improved (or at least maintained), and building officials should not be forced to make on-the-spot decisions about component efficiency. Modifications 4307, 4309, 4317, 4327, and 4329 all fail these basic principles, and should be rejected.

Modification 4307 creates enforcement issues because the definition of “permanent shading” does not actually require that interior shading devices, glazing material, or adherent materials be “permanent,” nor does it require that these products be independently rated for efficiency. It is not clear from these proposals how a building official is supposed to calculate the SHGC of interior shading, and whether that includes venetian blinds or storm curtains. Uniform, objective ratings for products (such as R-value, SHGC, and U-factor) keep building officials out of the business of ad-hoc decisions on the building site. This modification should be rejected because it creates ambiguity and does not result in additional energy efficiency.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4307-G2

Proponent Garrett Stone **Submitted** 6/1/2010 **Attachments** No

Comment:

Modification 4307 adds a new, very broad definition of “permanent shading” to the code that is not currently used in any other state or national code. Several of the provisions in this definition would create huge ambiguity and compliance issues, and it is not clear that this definition (or any of the related modifications) would save an equivalent amount of energy. In fact, given the items included in the definition, the label “permanent” simply does not apply. The definition should be rejected for a number of reasons:

1. “Adherent materials” and interior shading devices have never been allowed in any version of the IECC as a prescriptive trade-off for SHGC. Indeed, it is not clear what is actually included in “adherent materials.”
2. Although the definition requires that exterior devices or building elements be “permanently attached,” the definition does not make clear that interior shading devices and adherent materials are required to be “permanently attached,” nor does it explain how such devices could be made permanent, even if that is the intent.
3. These types of materials and devices are not truly “permanent.” For example, ”adherent materials” can be removed or damaged, and are certainly not as durable as windows with proper SHGC coatings. If occupants demand more daylighting or a less obstructed view, these materials can simply be removed, and all savings are eliminated.
4. Likewise, interior window shades do not provide permanent reductions in SHGC because they can be operated at non-optimal times or completely removed by occupants, whereas low-SHGC windows will perform in a predictable manner regardless of the occupant.

For the reasons above, we urge the Commission to reject Modification 4307 and all other modifications that cite to this definition (4309, 4317, 4327, and 4329).

1st Comment Period History 04/15/2010 - 06/01/2010

EN4307-G3

Proponent Thomas Larson **Submitted** 6/1/2010 **Attachments** No

Comment:

SACE's main interest in code revision is to advance energy efficiency as fast and as much as possible, respecting full life-cycle cost effectiveness. Fla. Energy Code should be aligned with IECC 2009 & successive revisions as closely as possible, and contribute to 20% energy improvement over 2007. We offer comment on this proposal:

• The Energy Code Workgroup carefully reviewed the IECC and the Florida Building Code and combined them in a manner that ensured a reasonable level of flexibility for builders, while reaching a 20% improvement in energy efficiency over the 2004 FBC.
• These proposals introduce a long list of alternative products that are not guaranteed to meet the same level of efficiency as the low-SHGC windows proposed in the code. The proposals also introduce a high level of ambiguity into the code and could create problems for code officials.
• Many of the products or devices listed as exceptions to the low-SHGC window requirement are either less durable than windows or can be easily removed by homeowners. There is no reason to allow trade-offs between SHGC, which is rated and labeled to a uniform standard, and products that may not be rated at all.
• It is much easier and more cost effective to install the correct glazing products in the first place. These proposals would create incentives to install windows that are not appropriate for Florida’s climate.
• While well-designed shading can bring additional benefits to buildings, credit for shading is confined to computer-simulated compliance methods in which the precise impact can be measured.
• By contrast, the proposed set of alternatives allows shading (and a long list of other practices not typically allowed as trade-offs) to be directly traded off against SHGC.
• The benefits of low-SHGC windows are well settled. They result in lower energy bills, lower peak demand, and a lower environmental impact. These benefits should not be traded away for less certain benefits.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4307-G4

Proponent Eric Lacey **Submitted** 6/1/2010 **Attachments** No

Comment:

By attempting to define “permanent shading,” Mod 4307 is connected to Mods 4309, 4317, 4327, or 4329, which attempt to create exceptions to window SHGC requirements where there is “permanent shading.” RECA recommends rejection of Mod 4307 because the proposed definition for “permanent shading” is virtually impossible to consistently enforce, creates potential liability issues for building officials and builders, includes shading approaches that are not permanent and does not guarantee equivalent energy savings.

• Because the definition includes terms such as “interior shading devices” and “adherent materials,” it is far from clear what devices and approaches would qualify as “permanent shading.” It appears that this language could be construed to include operable window shades, window films, or other operable, less permanent and/or untested products, which could then be used to supplant objectively rated window products.
• The definition does not require that adherent materials or other permanent shading devices be objectively rated, and it is unclear how a building official or builder could determine the equivalence of such materials to the SHGC rating provided on an NFRC label. Although we assume the definition includes to window films, it does not appear to exclude other products that are not intended for use on building fenestration.

Mod 4307 creates a host of problems for builders and code officials, and the proponent has not shown that equivalent or superior energy savings would result from creating the open-ended definition for permanent shading. Mod 4307 should be rejected.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4307-G5

Proponent	jeff inks	Submitted	6/1/2010	Attachments	No

Comment:

We recommend disapproval of this proposal. In addition to comments submitted on EN: 4309, 4317, 4327 & 4329 in opposition to including prescriptive permanent shading provisions, there are also concerns with this proposed definition. Among other concerns, the terms included in the definition are ill-defined for code purposes and none are necessarily permanent in nature.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4307-G6

Proponent	Harry Misuriello	Submitted	6/1/2010	Attachments	No

Comment:

Mod 4307 should be disapproved. The proposed definition of “permanent shading” provides numerous loopholes and exceptions that are to not likely to be as effective (e.g. interior shading) as the SHGC they replace, or even rated for comparable SHGC performance (e.g. adherent materials). This proposed Mod will place new interpretation burdens on code officials and not move the Florida energy code towards 20% energy efficiency improvement. The proposed Mod also has compliance and enforceability issues in interpreting its complicated requirements. We urge the Task Group and Commission to disapprove this proposed Mod.

Permanent Shading is the protection from heat gains due to direct solar radiation by permanently attached exterior devices or building elements, interior shading devices, glazing material, or adherent materials.

Permanent Shading is permanently attached exterior devices or building elements, interior shading devices, glazing material, or adherent materials that have been tested by nationally-accepted standards or procedures and certified by the manufacturer to reduce heat gains due to direct solar radiation.

Shading in the Florida Building Code - Energy

The urgent demand to conserve energy and reduce cooling operations in warm climates has re-opened the centuries-old, common sense practice of controlling solar heat gain through the use of shading. In the past, only overhangs and projections were typical methods of providing such shading. However, today modern materials and innovative designs can provide functional, and high performing shading features that are architecturally pleasing.

Well-placed shading can result in energy savings by reducing direct solar gain through windows. Peak electricity demand is also reduced by shading resulting in lower peak demand charges from utilities and reduced mechanical equipment costs, thereby contributing to a more sustainable building. Shading has the ability to reduce glare in an interior space without the need to lower shades or close blinds, which results in maximum natural daylighting and less use of artificial lighting. Shading existing fenestration (clear single or double glazed) may be a viable and economical option when compared to replacement with highest performing soft-coat, low-E windows and doors with glass.

The state of Florida has recognized that usefulness of shading by including the concept in State Statute 553.9061 addressing scheduled increases in thermal efficiency standards. This statute has directed "the Florida Building Commission …to…identify within code support and compliance documentation the specific building options and elements available to meet the energy performance goals established in subsection (1). Energy efficiency performance options and elements include, but are not limited to:

(see ITEM J) Shading devices, sunscreening materials, and overhangs.

Link:
http://www.leg.state.fl.us/statutes/index.cfm?mode=View%20Statutes&SubMenu=1&App_mode=Display_Statute&Search_String=553.9061+++++++Scheduled+increases+in+thermal+efficiency+standards&URL=0500-0599/0553/Sections/0553.9061.html

Having recognized this requirement in the state statue, this proposal offers options to comply, including high performance windows.

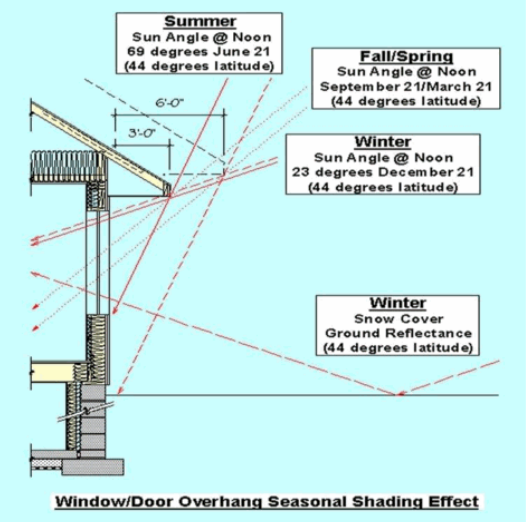
Regardless of the method used to for shading, many factors must be taken into consideration when using shading, such as:

- Geographic location (latitude and longitude)
- Building exposure to be shaded (south, east, or west)
- Time of year for complete or partial shading
- Critical time of day for shading
- The sun's position, azimuth, and altitude based on the location of the area to be shaded

Having definitions and multiple choices among the various broad shading options make the state statute enforceable.

The broad categories of permanent shading products are as follows:

Projections, such as overhangs, fins, eaves, and similar architectural features



Window/Door Overhang Seasonal Shading Effect

For projections to be effective, the projection must effectively shade the glazed opening. ASHRAE 90.1 provides calculation for a projection factor that offers the dimensions for proper shading from projections.

PF = A/B

PF = Projection factor (decimal).

A = Distance measured horizontally from the furthest continuous extremity of any overhang, eave, or permanently attached shading device to the vertical surface of the glazing.

B = Distance measured vertically from the bottom of the glazing to the underside of the overhang, eave, or permanently attached shading device.

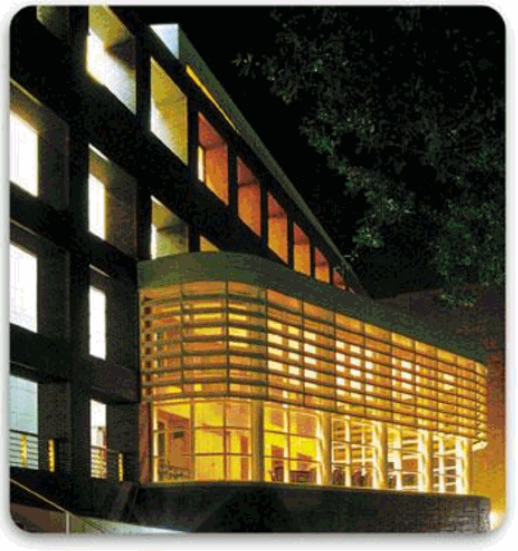
Projections

Sun Shades – cantilevered, horizontal line, and vertical line

Cantilevered. These sunshades are most effective on southern elevation during the midday hours when the sun is at its highest point in the sky. These systems are most often comprised of a series of slats or blades, available in many styles that provide a visually appealing application. The slats/blades allow for wind, and in some cases snow, to pass through. A suspended system distributes the load from the exterior sunshade to the building structure.

Cantilever Sunshade

Horizontal Line. Horizontal line sunshades are most effective when used on tall expanses of glass or on curtain walls where attaching a series of cantilevered sunshades on top of each other is not practical.



Horizontal Line Sunshade

Vertical Line. Vertical line sunshades are most effect on east and west elevations to block the low sun angles in the early morning and late afternoon. Typically, a hollow extruded shape sets either perpendicular to the building or at a slight rotation to maximize solar protection while providing occupants with the maximum amount of visibility to the outside.

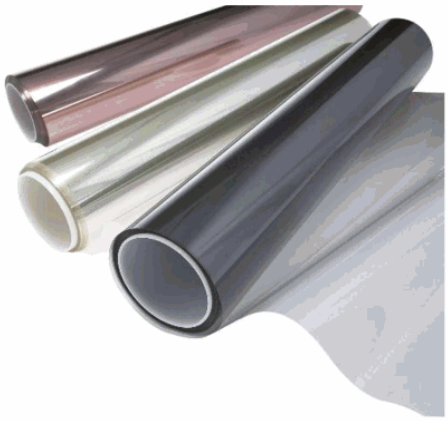
Vertical Line Sunshade

Window Film

Generally, window film provides specific personal and property protection from the effects of the sun as well as added safety and security in the events that result in broken glass. The efficiencies of solar control window films are closely related to local weather conditions, building orientation, window size, and other factors such as exterior shading conditions.

There are many types and constructions of solar control and safety window films. These films are considered in the building industry to be "retrofit" products; that is, products to be applied to existing buildings as opposed to use in new construction. In their simplest forms, window films are composed of a polyester substrate to which a scratch resistant coating is applied on one side; a mounting adhesive layer and a protective release liner is applied to the other side.

The effective life of window film will vary by the type of film, type of glass, window construction, compass orientation of glass, and in which part of the world the building is located. There are documented cases of film lasting 12 to 22 years or more in some instances.



Window Film

Louvers

Louvered sun screens provide shade and functional ventilation. Louvers can be designed with either vertical or horizontal blades and can be fixed or operational. Operational louvers can be designed to automatically move with the sun to reduce solar heat gain and glare, lower energy usage and maximize daylight. By effectively controlling the sun on all elevations, at all times of the day and throughout the year, controllable sunshades can significantly reduce the building's energy and capital equipment costs. These sunshades also prevent over or under shading so building occupants can always enjoy the benefits of natural daylight.

Operational Louvered Sunshade

Date Submitted	3/26/2010	**Section**	402.1.1	**Proponent**	Eric Lacey
Chapter	4	**Affects HVHZ**	Yes	**Attachments**	Yes

TAC Recommendation No Affirmative Recommendation with a Second

Commission Action Pending Review

Related Modifications

Summary of Modification

This proposal creates a second option for builders to install roofing materials with a solar reflectance over 0.10, as long as the area-weighted average fenestration SHGC does not exceed 0.25.

Rationale

(See attached file for detailed reason statement.) This proposal creates a second option for builders to install roofing materials with a solar reflectance over 0.10, as long as the area-weighted average fenestration SHGC does not exceed 0.25.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

This proposal will not complicate enforcement of the code.

Impact to building and property owners relative to cost of compliance with code

The proposal will allow increased flexibility within the prescriptive path, and should ultimately save homeowners money.

Impact to industry relative to the cost of compliance with code

The increased flexibility of this proposal will also give builders more options to comply with the code, reducing initial construction costs.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

This proposal will maintain a reasonable level of energy efficiency.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

The proposal allows two different methods for controlling solar heat gain, which will allow more flexibility.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

Given the wide availability of low-SHGC windows, this proposal should expand the number of options for builders and design professionals to comply with the prescriptive option.

Does not degrade the effectiveness of the code

The proposal does not degrade the effectiveness of the code.

Alternate Language

2nd Comment Period 09/03/2010 - 10/18/2010

EN3956-A4

Proponent Eric Lacey **Submitted** 10/18/2010 **Attachments** Yes

Rationale

These revisions further improve the prescriptive path proposed in EN3956 Alternate Language 3 by clarifying code requirements and creating a simple prescriptive option. The resulting changes create a realistic and energy efficient compliance option for builders who do not wish to carry out a complete performance analysis.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

A simple prescriptive option will simplify enforcement of the code.

Impact to building and property owners relative to cost of compliance with code

The cost impact should be positive because the alternative language requires widely-available products and provides builders with sensible options.

Impact to industry relative to the cost of compliance with code

Compliance should be simpler and more streamlined.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Energy efficiency is an important part of any comprehensive building code.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

This proposal maintains the stringency of the code and improves its prescriptive option.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

This proposal is product neutral.

Does not degrade the effectiveness of the code

This proposal will provide for a more effective code.

Alternate Language

1st Comment Period History 04/15/2010 - 06/01/2010

EN3956-A3

Proponent Arlene Stewart **Submitted** 6/1/2010 **Attachments** Yes

Rationale

This comment offers alternative language for the presecriptive path. These provisions integrate the 20% improvement required by statue by improving provisions that are more mature in the marketplace, thereby making usage easier and more cost effective. The addition of roof reflectance is a relatively new concept - consequently less product has the appropriate testing. The original incorporation includes a highly efficient white roof. The combination of tested material AND highly efficient ma

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

None. The products and processes included in this comment are already in use today.

Impact to building and property owners relative to cost of compliance with code

None. This comment provides an equivalent energy performance as indicated by statue. Therefore the operational cost to the owner will remain the same.

Impact to industry relative to the cost of compliance with code

This is expected to lessen the cost because the prescriptive compliance path is meant to be simple. The changes made reflect more commonly available provisions, thereby saving builders time and therefore dollars because of more mature market competition than the original provision.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

This comment offers an alternative with mainstream, readily available products, therefore making the implementation easier, leading to better health, safety and welfare of the general public.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

It improves the code because it uses mainstream provisions in a simple way, leading to easier compliance.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

It does not discriminate against materials. The prescriptive path is only one way to comply with this code.

Does not degrade the effectiveness of the code

No. It provides an equivalent performance to meet the legislative requirement of 20% better.

Alternate Language

1st Comment Period History 04/15/2010 - 06/01/2010

EN3956-A2

Proponent Roger LeBrun **Submitted** 5/21/2010 **Attachments** Yes

Rationale

Increases efficiency of the code by allowing sufficient daylight to realize energy savings that more than offset cooling energy losses. Also would permit the use of more tubular daylighting devices (TDDs), many types of which would otherwise not comply.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

None

Impact to building and property owners relative to cost of compliance with code

None

Impact to industry relative to the cost of compliance with code

None

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Same as original proposal

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Adds options at no energy cost

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

Expands the options available for compliance

Does not degrade the effectiveness of the code

Improves the code's efficiency

TABLE 402.1.1

COMPONENT EFFICIENCIES REQUIRED[a,l]

% Glazing[c]	Fenestration U-Factor[b]	Sky-light[b] U-Factor	Glazed Fenes-tration SHGC[b]	~~Ceiling~~ ~~R-value~~	Roof Reflectance Tested per S. 405.6.2	Ceiling R-value	Wood Frame Wall R-value	Mass Wall R-value[i]	Floor R-value / Slab R-value[d]	Door U-Factor	Ducts: R-value/ Location[k]	Air Handler Location[k,]	Air Leakage Tested per S. 403.2.2.1
20%	0.65[j]	0.75	0.30 [0.25][e]	~~30~~	0.25 [0.10][e]	30	13	6 / 7.8	13/0	0.65	R-6/ Conditioned	Conditioned	Qn=0.03

For SI: 1 foot = 304.8 mm.

a. R-values are minimums. U-factors and SHGC are maximums. R-19 batts compressed into a nominal 2 × 6 framing cavity such that the R-value is reduced by R-1 or more shall be marked with the compressed batt R-value in addition to the full thickness R-value.

b. The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration.

c. Percent glazing shown shall be the maximum glazing allowed for compliance by Section 402. Percent glazing area shall be measured in window to floor area and shall include skylight area

d. R-5 shall be the required slab edge R-values for heated slabs only; insulation depth shall be the depth of the footing or 2 feet, whichever is. No insulation is required for unheated slabs, basement walls or crawl space walls.

e. ~~Reserved.~~ Where area-weighted average maximum SHGC for fenestration does not exceed 0.25, roof solar reflectance shall meet or exceed 0.10.

f. Reserved.

g. Or insulation sufficient to fill the framing cavity, R-19 minimum.

h. "13+5" means R-13 cavity insulation plus R-5 insulated sheathing. If structural sheathing covers 25 percent or less of the exterior, insulating sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25 percent of exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.

i. The second R-value applies when more than half the insulation is on the interior of the mass wall.

j. For impact rated fenestration complying with Section R301.2.1.2 of the Florida Building Code, Residential or Section 1609.1.2 of the Florida Building Code, Building the maximum U-factor shall be 0.75.

k. Conditioned= entire distribution system located inside both the thermal and air barrier of the home. Unconditioned = any portion located in unconditioned space.

l. Limitations to compliance by Section 402 found in Section 402.2 shall be met.

(Portions of table and footnotes not shown shall remain unchanged.)

(Image file showing revisions to the original proposal was uploaded)

TABLE 402.1.1

COMPONENT EFFICIENCIES REQUIRED[a,l]

Vertical Fenestration U-Factor~~b~~	Skylight~~b~~ U-Factor	~~Glazed~~ Vertical Fenestration SHGC~~b~~	Skylight SHGC
0.65[j]	0.75	0.30 [0.25][e]	0.35

b. ~~The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration.~~ Reserved.

e. ~~Reserved.~~ Where area-weighted average maximum SHGC for vertical fenestration does not exceed 0.25, roof solar reflectance shall meet or exceed 0.10.

j. For impact rated vertical fenestration complying with Section R301.2.1.2 of the Florida Building Code, Residential or Section 1609.1.2 of the Florida Building Code, Building the maximum U-factor shall be 0.75.

(Portions of proposed table and footnotes not shown shall remain unchanged.)

TABLE 402.1.1

COMPONENT EFFICIENCIES REQUIRED[a,l]

% Glazing[c]	Fenestration U-Factor[b]	Sky-light[b] U-Factor	Glazed Fenes-tration SHGC[b]	Ceiling R-value	Roof Reflectance Tested per S. 405.6.2	Wood Frame Wall R-value	Mass Wall R-value[l]	Floor R-value/ Slab R-value[d]	Door U-Factor	Ducts: R-value and Location[k]	Air Handler Location[k,]	Du Le T p 40
~~20%~~ 18%	0.65[j]	0.75	~~0.30~~ 0.25[e]	30	0.25/NR[e]	13	6 / 7.8	13/0	0.65	R-6 and Conditioned/NR[e]	ConditionedQn=(	

e. ~~Reserved.~~ Where all ducts are located within the thermal building envelope, there is no requirement (NR) for roof reflectance, duct insulation, or duct air leakage testing.

TABLE 402.1.1.3

EQUIVALENT U-FACTORS[a,f,g]

e. Window to floor area, including skylights, shall not exceed ~~20~~ 18 percent. See Section 402.1.2.3.

(Portions of table 402.1.1 and footnotes not shown shall remain unchanged.)

Revise sections 402.1.2.3 and 403.2.2 as follows:

402.1.2.3 Maximum percent window area. The window area as a percentage of the conditioned floor area (CFA) shall not exceed 18~~20~~ percent.

403.2.2 Sealing (Mandatory). All ducts, air handlers, filter boxes and building cavities which form the primary air containment

passageways for air distribution systems shall be considered ducts or plenum chambers, shall be constructed and sealed in accordance with Section 503.2.7.2 of this code and shall be shown to meet duct tightness criteria in Section 403.2.2.1.

Exception: For buildings complying under Section 402, where air handler and all ducts are located within the thermal building envelope, the test required in Section 403.2.2.1 is not required.

(Portions of sections 402.1.2.3 and 403.2.2 not shown shall remain unchanged.)

Revise Table 402.1.1 and 402.1.1.3 as follows:

TABLE 402.1.1

COMPONENT EFFICIENCIES REQUIRED[a,l]

% Glazing[c]	Fenestration U-Factor[b]	Sky-light[b] U-Factor	Glazed Fenes-tration SHGC[b]	Ceiling R-value	Roof Reflectance Tested per S. 405.6.2	Wood Frame Wall R-value	Mass Wall R-value[l]	Floor R-value / Slab R-value[d]	Door U-Factor	Ducts: R-value and Location[k]	Air Handler Location[k,]	Duct Air Leakage Tested per S. 403.2.2.1
20%	0.65[j]	0.75	~~0.30~~ 0.25	30	0.25/NR[e]	13	6 / 7.8	13/0	0.65	R-6 / Unconditioned or NR/ Conditioned[e]	Conditioned	Qn=0.03

b. The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration. Exception: Skylights may be excluded from glazed fenestration SHGC requirements where the SHGC for such skylights does not exceed 0.30.

c. Percent glazing shown shall be the maximum glazing allowed for compliance by Section 402. Percent glazing area shall be measured in window to conditioned floor area and shall include skylight area. Total skylight area shall not exceed 3% of conditioned floor area.

***

e. ~~Reserved.~~ Where air handler and all ducts are located within the thermal building envelope, there is no requirement (NR) for roof reflectance or duct insulation.

(Portions of table 402.1.1 and footnotes not shown shall remain unchanged.)

Revisions to EN3956 Alternate Language 3

These revisions further improve the prescriptive path proposed in EN3956 Alternate Language 3 by clarifying code requirements and creating a simple prescriptive option. These modifications respond to questions raised by advocates and TAC members at the last code hearing. First, the modifications allow 20% fenestration area as in the original draft code. Footnote c clarifies that that skylights should be included in the total fenestration calculation, and are limited to 3% of conditioned floor area. Second, the proposed SHGC maximum of 0.25 for vertical fenestration is retained, but skylights are allowed a maximum of 0.30 SHGC. Third, where the air handler and all ducts are located inside conditioned space, ducts must still be tested, but there is no duct insulation or roof solar reflectance requirement.

This proposal creates a realistic and energy efficient compliance option for builders who do not wish to carry out a complete performance analysis. While highly-reflectant roof coatings can improve a home's efficiency, low-SHGC windows are widely available and cost effective in Florida, and they would not require any alterations to home design. The modifications above will also simplify compliance and enforcement whenever the prescriptive path is used, because code officials will be able to simply check off that all prescriptive requirements have been followed. We believe that the energy savings in this proposal will meet or exceed the savings in the original draft proposal.

Roof Reflectance or SHGC Option

This proposal incorporates a reasonable set of options for builders that will bring significant energy and cost savings to homeowners. Although we generally support the inclusion of a solar reflectance requirement in Florida's climate zones, the 2007 Florida Building Code (including the 2009 Supplement) did not include a prescriptive requirement for solar reflectance, nor does the 2009 IECC. We believe that the prescriptive path should offer a simple, component-based means of building efficient homes, but want to be cautious that the proposed prescriptive path can be readily utilized by the builder and wish to make sure, if possible, that no component of the prescriptive path creates a major impediment to use and acceptance of the path.

The proposal above creates a second option for builders who, because of product scarcity or design concerns, may not want to install materials with a solar reflectance over 0.25. In these circumstances, a builder could opt instead to install fenestration with an area-weighted average SHGC of 0.25 or less. The 0.10 solar reflectance requirement still eliminates many darker-colored roofing materials, but it allows a broader range of materials, including light-colored asphalt shingles. If the Committee determines that another number is more appropriate for this option – either higher or lower – we would not be opposed to a reasonable compromise number. For more information on roof solar reflectance, refer to the Florida Solar Energy Center's publication, *Laboratory Testing of the Reflectance Properties of Roofing Materials* at http://www.fsec.ucf.edu/en/publications/html/fsec-cr-670-00.

We also submitted a separate proposal that would require a 0.25 SHGC regardless of roof solar reflectance, and we consider that the most efficient option. Lower SHGC windows will bring increased comfort, lower summer peak demands, and will bring cost savings because of downsized HVAC equipment. Windows with a 0.25 SHGC are widely available and in many cases, cost no more than windows that meet the 0.30 SHGC. If, however, the Committee does not wish to require a 0.25 SHGC in all homes built to the prescriptive path, the proposal above represents a reasonable option that would still bring a 16% reduction in solar heat gain – a result that will achieve a benefit similar to a roof with high solar reflectance.

Date Submitted	3/26/2010	**Section**	402.1.1	**Proponent**	Eric Lacey
Chapter	4	**Affects HVHZ**	Yes	**Attachments**	Yes

TAC Recommendation No Affirmative Recommendation with a Second

Commission Action Pending Review

Related Modifications

3956

Summary of Modification

This proposal increases energy efficiency, reduces peak demand and sizing of cooling systems, and improves comfort for building occupants by lowering the prescriptive fenestration SHGC value to 0.25.

Rationale

(See attached file for detailed reason statement.) This proposal increases energy efficiency, reduces peak demand and sizing of cooling systems, and improves comfort for building occupants by lowering the prescriptive fenestration SHGC value to 0.25.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

This proposal will not impact enforcement of the code.

Impact to building and property owners relative to cost of compliance with code

The proposal will save building and property owners energy and money over the lifetime of the building.

Impact to industry relative to the cost of compliance with code

In many cases, there will be no cost impact associated with this proposal. In cases where there is an impact, the cost will be minimal.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

The proposal will increase occupant comfort and will reduce energy consumption.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

The proposal strengthens the effectiveness of the code by requiring more efficient fenestration.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

The proposal does not discriminate against any products or systems of construction. A wide variety of products on the market will meet this standard.

Does not degrade the effectiveness of the code

The proposal will not degrade the effectiveness of the code.

Alternate Language

2nd Comment Period 09/03/2010 - 10/18/2010

EN3957-A3

Proponent	Eric Lacey	**Submitted**	10/18/2010	**Attachments**	Yes

Rationale

This proposal increases energy efficiency, reduces peak demand and sizing of cooling systems, and improves comfort for building occupants by lowering the prescriptive SHGC value to 0.25. It also reflects a concern raised at the July hearing regarding the ability of skylights to meet a 0.25 SHGC. An amended footnote b allows skylights to meet the same SHGC requirement that is proposed in the current draft code (0.30).

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

This proposal will not impact the ability of local entities to enforce the code.

Impact to building and property owners relative to cost of compliance with code

The modification to the proposal relaxes the SHGC requirement for skylights, so there should be either no cost impact or a cost decrease.

Impact to industry relative to the cost of compliance with code

There should be no negative cost impact as a result of this modification.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Energy efficiency is integral to the health, safety, and welfare of the general public.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

This modification reasonably improves the energy efficiency of the code.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

The proposal is product-neutral.

Does not degrade the effectiveness of the code

This proposal does not degrade the effectiveness of the code.

Alternate Language

1st Comment Period History 04/15/2010 - 06/01/2010

EN3957-A2

Proponent Roger LeBrun **Submitted** 5/21/2010 **Attachments** Yes

Rationale

Increases efficiency of the code by allowing sufficient daylight to realize energy savings that more than offset cooling energy losses. Also would permit the use of more tubular daylighting devices (TDDs), many types of which would otherwise not comply.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

None

Impact to building and property owners relative to cost of compliance with code

None

Impact to industry relative to the cost of compliance with code

None

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Same as originally proposed

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Increases efficiency of the code

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

Expands options for compliance

Does not degrade the effectiveness of the code

Increases efficiency of the code

TABLE 402.1.1

COMPONENT EFFICIENCIES REQUIRED[a,l]

% Glazing[c]	Fenestration U-Factor[b]	Sky-light[b] U-Factor	Glazed Fenes-tration SHGC[b]	Ceiling R-value	Roof Reflectance Tested per S. 405.6.2	Wood Frame Wall R-value	Mass Wall R-value[l]	Floor R-value/ Slab R-value[d]	Door U-Factor	Ducts: R-value/ Location[k]	Air Handler Location[k,]	Air Leakage Tested per S. 403.2.2.1
20%	0.65[j]	0.75	~~0.30~~ 0.25	30	0.25	13	6 / 7.8	13/0	0.65	R-6/ Conditioned	Conditioned	Qn=0.03

(Portions of table and footnotes not shown shall remain unchanged.)

(Image was uploaded)

TABLE 402.1.1

COMPONENT EFFICIENCIES REQUIRED[a,l]

Vertical Fenestration U-Factor[b]	Skylight[b] U-Factor	~~Glazed~~Vertical Fenestration SHGC[b]	Skylight SHGC
0.65[j]	0.75	0.~~30~~25	0.35

b. ~~The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration.~~ Reserved.

e. ~~Reserved.~~ Where area-weighted average maximum SHGC for vertical fenestration does not exceed 0.25, roof solar reflectance shall meet or exceed 0.10.

j. For impact rated vertical fenestration complying with Section R301.2.1.2 of the Florida Building Code, Residential or Section 1609.1.2 of the Florida Building Code, Building the maximum U-factor shall be 0.75.

(Portions of proposed table and footnotes not shown shall remain unchanged.)

Revise Table 402.1.1 as follows:

TABLE 402.1.1

INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT [a]

FENESTRATION U-FACTOR[b]	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC[b]
0.65[j]	0.75	~~0.30~~ 0.25

b. The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration. Exception: Skylights may be excluded from glazed fenestration SHGC requirements where the SHGC for such skylights does not exceed 0.30.

(Other footnotes remain unchanged)

RECA Public Comment to EN3957 re: Fenestration SHGC 0.25

TABLE 402.1.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT [a]

FENESTRATION U-FACTOR[b]	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC[b]
0.65[i]	0.75	0.25

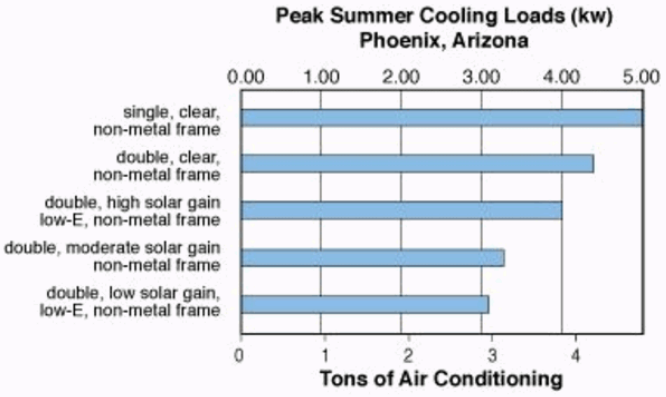
b. The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration. Exception: Skylights may be excluded from glazed fenestration SHGC requirements where the SHGC for such skylights does not exceed 0.30.

(Other footnotes remain unchanged)

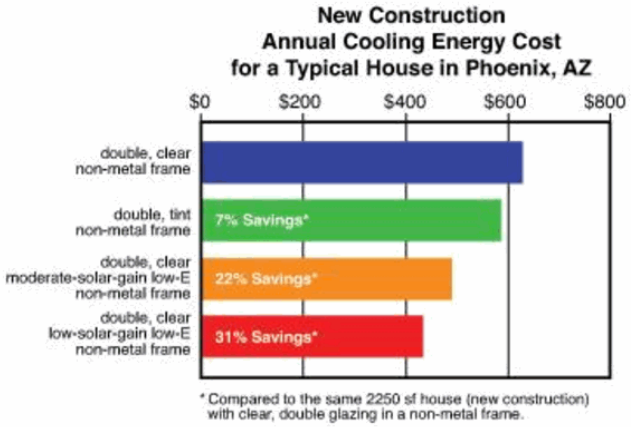
This proposal increases energy efficiency, reduces peak demand and sizing of cooling systems, and improves comfort for building occupants by lowering the prescriptive SHGC value to 0.25. It also reflects a concern raised at the July hearing regarding the ability of skylights to meet a 0.25 SHGC. An amended footnote b allows skylights to meet the same SHGC requirement that is proposed in the current draft code (0.30).

The justifications for a 0.25 SHGC requirement contained in the Reason Statement for EN3957 still apply, so they will not be repeated here. We continue to believe that this proposal represents a reasonable and cost effective improvement that will provide states and local jurisdictions with an option to easily increase the efficiency of their code.

To further demonstrate the benefits of 0.25 SHGC fenestration, we are submitting two tables from the website of the Efficient Windows Collaborative.
(See www.efficientwindows.org/hvac.cfm; www.efficientwindows.org/energycosts.cfm; and www.efficientwindows.org/lightview.cfm).
These tables further illustrate the peak demand, HVAC sizing and energy savings benefits of low solar gain glass, as well as how such glass can provide substantial benefits in solar heat reduction while retaining substantial visible light, if so desired (the solar heat gain is blocked primarily in the non-visible part of the spectrum). The first graph displays the benefits of low solar gain low-e (SHGC equal to or below 0.25), compared with some other SHGC options from a peak demand/HVAC sizing point of view:



The second graph displays potential cooling cost savings for moving from a moderate solar gain low-e product to a low solar gain low-e product – 22% savings to 31% savings:



A 0.25 SHGC requirement for fenestration is achievable in Florida, and it will bring energy savings, peak demand savings, and equipment cost savings to Florida homeowners.

Fenestration SHGC 0.25

This proposal increases energy efficiency, reduces peak demand and sizing of cooling systems, and improves comfort for building occupants by lowering the prescriptive SHGC value to 0.25. While we support the current proposal to lower SHGC from 0.35 to 0.30, we believe an additional measure of stringency will reduce energy usage resulting in lower utility bills to homeowners and will help curb the use of expensive peak electricity generation for summer peak demands.

The 0.25 SHGC requirement has already been explored by the Florida Solar Energy Center (FSEC), and has been discussed in previous meetings of the Energy Task Group. In a September 3, 2009 report to the Task Group, *Getting to 50, What Will it Take*, Philip Fairey summarized the results and recommendations of FSEC regarding the appropriate SHGC requirement for Florida's climate zones. The report's "Best Practices Analysis" found that a 0.25 SHGC is cost effective and will save energy statewide. The complete report can be found at http://consensus.fsu.edu/FBC/2010-Florida-Energy-Code/FSEC_Presentation_Energy_Increases.pdf.

The proposal above reflects that recommendation by establishing a statewide 0.25 SHGC. This improvement would reduce fenestration solar gain by over 28% as compared with the 2007 Florida Building Code (or over 16% as compared to the current draft). There should be no significant construction cost impact from this increase in energy code stringency since the existing SHGC requirements already effectively dictate a low solar gain low-e window and the new requirements will also require low solar gain low-e glass, but only with a lower SHGC. The FSEC "Best Practices Analysis" cited above found that 0.25 SHGC is within a "reasonable technology limit." Such lower SHGC glass is readily available in the market. A recent review of the NFRC product certification database showed that of over 5.3 million certified window listings, over 2.1 million windows, or **51% of all certified window listings nationwide achieve a 0.25 SHGC or lower**. Given the wide availability of windows that meet the requirement proposed above, there should be no significant cost impact. By contrast, the impact on energy savings is substantial. Moreover, the potential for smaller HVAC systems could generate substantial cost savings at initial construction and every time the HVAC system is replaced for the lifetime of the home.

This proposal represents a reasonable and cost effective improvement that will provide states and local jurisdictions with an option to easily increase the efficiency of their code.

Date Submitted	4/1/2010	**Section**	402.3.2.1 (NEW)	**Proponent**	Amanda Hickman
Chapter	4	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation No Affirmative Recommendation with a Second

Commission Action Pending Review

Related Modifications

Mod 4307 - add definition for "Permanent Shading".

Summary of Modification

Adds compliance paths for meeting SHGC values in table 402.1.1.

Rationale

see attached

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

There is no fiscal impact to enforcement of the code.

Impact to building and property owners relative to cost of compliance with code

It can potentially decrease the cost of code compliance by offering multiple options to accomplish energy savings.

Impact to industry relative to the cost of compliance with code

There may be a slight increase in cost to industry in order to show SHGC equivalency with Table 402.1.1. Some of these costs may include: design guides, product specifications, marketing materials and advanced product development.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

The correct use of shading encourages natural daylighting (as opposed to decreasing the window to wall ration or dark glass) which has been shown to improve productivity and better sense of well being.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Yes, this modification encourages product options and flexibility.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

No, this modification encourages product options and flexibility

Does not degrade the effectiveness of the code

This modification will increase the usability and effectiveness of the code for the building and design community, while ensuring that the new fenestration is energy efficient.

2nd Comment Period 09/03/2010 - 10/18/2010

EN4309-G7

Proponent Amanda Hickman **Submitted** 10/18/2010 **Attachments** Yes

Comment:

The Building Code Act of 2008 (HB 697) requires that energy efficiency performance goals be achieved through elements such as “shading devices, sunscreening materials, and overhangs.” This proposal is in line with that directive and we respectfully request that the TAC take a second look at the proposed language. Please see the attached rationale document.

2nd Comment Period 09/03/2010 - 10/18/2010

EN4309-G8

Proponent Dwight Wilkes **Submitted** 10/18/2010 **Attachments** No

Comment:

Adds compliance paths for meeting SHGC values in Table 402.1.1 and should be approved.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4309-G1

Proponent Brian Sernulka **Submitted** 6/1/2010 **Attachments** No

Comment:

BCAP believes that the Florida Building Code should be efficient, simple, and enforceable. Any trade-offs or exceptions to code requirements should be narrowly defined so that energy efficiency is improved (or at least maintained), and building officials should not be forced to make on-the-spot decisions about component efficiency. Modifications 4307, 4309, 4317, 4327, and 4329 all fail these basic principles, and should be rejected.

Modification 4309 adds complicated, open-ended exceptions to the fenestration SHGC requirement for products that may not ensure equivalence in efficiency or durability. The modification encourages the use of products in residential and commercial settings that are not as well-regulated or uniform as SHGC.

Language in the proposal is not appropriate for code (and would be difficult for code officials to enforce). For example, it is not clear how a code official can determine whether a “combination of adherent shading material or device and fenestration product to achieve[s] the equivalent SHGC” required by the code. SHGC is listed on fenestration NFRC labels, requiring no calculation or additional verification by building officials. By contrast, the exceptions described in modification 4309 do not specify any uniform rating method for “adherent shading materials” or “devices.” The Florida Building Code should not place a building official in the position of having to calculate (or speculate) the SHGC values of non-fenestration products.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4309-G2

Proponent Garrett Stone **Submitted** 6/1/2010 **Attachments** No

Comment:

Modification 4309 should be rejected because it creates several unnecessary and unenforceable exceptions to the fenestration SHGC rating that will likely save much less energy and peak demand. None of these exceptions can guarantee the same durability or the objective performance of fenestration with uniform SHGC ratings.
1. Windows are typically installed to allow occupants to see outdoors. This modification would encourage the use of laundry list of attachments to the window such as window films, louvers, shades, or other measures that would obstruct occupant views. Many of these products are not as permanent as windows, are subject to decisions by the homeowner or can be relatively easily removed or damaged so as not to work effectively, eliminating any energy savings.
2. Even if a window shade is attached with “fasteners that require additional tools,” this does not make the shading permanent. Occupants may simply roll up adjustable shades, and all perceived energy savings would be eliminated.
Modification 4309 adds ambiguity to the code without any clear energy efficiency benefit. We urge the Commission to reject this modification.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4309-G3

Proponent Thomas Larson **Submitted** 6/1/2010 **Attachments** No

Comment:

SACE's main interest in code revision is to advance energy efficiency as fast and as much as possible, respecting full life-cycle cost effectiveness. Fla. Energy Code should be aligned with IECC 2009 & successive revisions as closely as possible, and contribute to 20% energy improvement over 2007. We offer comment on this proposal:
• The Energy Code Workgroup carefully reviewed the IECC and the Florida Building Code and combined them in a manner that ensured a reasonable level of flexibility for builders, while reaching a 20% improvement in energy efficiency over the 2004 FBC.
• These proposals introduce a long list of alternative products that are not guaranteed to meet the same level of efficiency as the low-SHGC windows proposed in the code. The proposals also introduce a high level of ambiguity into the code and could create problems for code officials.
• Many of the products or devices listed as exceptions to the low-SHGC window requirement are either less durable than windows or can be easily removed by homeowners. There is no reason to allow trade-offs between SHGC, which is rated and labeled to a uniform standard, and products that may not be rated at all.
• It is much easier and more cost effective to install the correct glazing products in the first place. These proposals would create incentives to install windows that are not appropriate for Florida’s climate.
• While well-designed shading can bring additional benefits to buildings, credit for shading is confined to computer-simulated compliance methods in which the precise impact can be measured.
• By contrast, the proposed set of alternatives allows shading (and a long list of other practices not typically allowed as trade-offs) to be directly traded off against SHGC.
• The benefits of low-SHGC windows are well settled. They result in lower energy bills, lower peak demand, and a lower environmental impact. These benefits should not be traded away for less certain benefits.

1st Comment Period History 04/15/2010 - 06/01/2010

Proponent Eric Lacey **Submitted** 6/1/2010 **Attachments** No

EN4309-G4

Comment:

The primary objectives for energy code modifications in this code cycle should be to improve the Florida code by: (1) tracking the nature, structure and provisions of the IECC, wherever possible; and (2) contributing to a 20% increase in energy efficiency compared to the 2004 Florida Building Code. Mods 4307, 4317, 4327, and 4329 should be disapproved because they defeat both of these objectives.

Mod 4309 creates SHGC exceptions for shading or overhangs have never been allowed in the IECC's simple residential prescriptive option and should not be added to the Florida code. We are aware of no energy code that allows "adherent shading material" (whatever this means) to qualify for code compliance. Aside from over-complicating the simple prescriptive option, these mods create significant compliance problems and loopholes for no apparent energy efficiency benefit:

• The mod does not clearly define what qualifies as an exterior louver or adherent shading material or device, creating a potentially large loophole; nor does the proposal show how these approaches can provide similar long-term savings as an alternative to low solar gain windows.

• Calculation of what is "optimal" for overhangs will make code compliance and enforcement very difficult. The calculations required for shading options would make the prescriptive option confusing at best and unenforceable at worst.

• The mod does not require compliance with any national, objective rating system for any of the listed options.

Mod 4309 contains terminology that is not appropriate for mandatory code, and it would place code officials in the difficult position of determining what qualifies for the trade-off. Because window SHGC can be objectively determined, easily verified by building officials, and consistently installed by builders, there is no reason to create this loophole. Mod 4309 should be rejected.

1st Comment Period History 04/15/2010 - 06/01/2010

Proponent jeff inks **Submitted** 6/1/2010 **Attachments** No

EN4309-G5

Comment:

We recommend disapproval of this proposal. Prescriptive requirements for permanent shading should be considered much more thoroughly if they are to be included in the code, if at all. Permanent shading is not a prescriptive attribute for which selecting an option from a limited set of provisions can be relied upon to implement it correctly and effectively. There are many factors that must be carefully considered in order to do so, and if implemented incorrectly, can result in less efficient building operation and greater energy consumption. Providing prescriptive permanent shading options is also not necessary to achieve the state's objective of increasing the stringency of the Florida 2010 energy code by 20%.

1st Comment Period History 04/15/2010 - 06/01/2010

Proponent Harry Misuriello **Submitted** 6/1/2010 **Attachments** No

EN4309-G6

Comment:

Mod 4309 should not be approved. This is because it proposes a new requirement that has historically been rejected for inclusion in the IECC. Approval of this Mod would represent a departure from the objectives of this code development cycle which include alignment with the IECC structure and provisions. The IECC as published represents the predominant view of the nation's code officials concerning reasonable solar gain control that reduce energy usage and mitigate peak electrical demand in Florida's climate zones. The proposed Mod also has compliance and enforceability issues in interpreting its complicated requirements. We urge the Task Group and Commission to disapprove this proposed Mod.

Add new text as follows:

402.3.2.1 Permanent Shading. Where Table 402.1.1 requires a solar heat gain coefficient (SHGC), the requirements shall be met by either:

1. Installing fenestration products that have an area weighted average SHGC equal to or lower than that shown in Table 402.1.1, or

2. A permanent shading device, such as, but not limited to, an exterior louver that provides the equivalent solar heat gain coefficient as required in Table 402.1.1. Exterior shading devices must be permanently attached to the outside of the structure with fasteners that require additional tools or equipment to remove (as opposed to clips, hooks, latches, snaps, or ties), or

3. A combination of adherent shading material or device and fenestration product to achieve the equivalent solar heat gain coefficient as required in Table 402.1.1

4. For south-facing glazing by optimal overhangs constructed or installed so that the south-facing glazing is fully shaded at solar noon on August 21 and substantially exposed to direct sunlight at solar noon on December 21.

Add new text as follows:

402.3.2.1 Permanent Window Shading. Where Table 402.1.1 requires a solar heat gain coefficient (SHGC), the requirements shall be met by either:

1. Installing ~~fenestration products~~ windows that have an area weighted average SHGC equal to or lower than that shown in Table 402.1.1, or

2. ~~A~~ Utilizing a permanent shading device, such as, but not limited to, an exterior louver that provides the equivalent solar heat gain coefficient as required in Table 402.1.1. ~~Exterior~~ Such shading devices must be permanently attached to the outside of the structure with fasteners that require additional tools or equipment to remove (as opposed to clips, hooks, latches, snaps, or ties), or

3. ~~A~~ Utilizing a combination of adherent shading material or device and ~~fenestration product~~ window to achieve the equivalent solar heat gain coefficient as required in Table 402.1.1

~~4. For south-facing glazing by optimal o~~Overhangs shall be constructed or installed so that the south-facing glazing is fully shaded at solar noon on August 21 and ~~substantially~~ 80% exposed to direct sunlight at solar noon on December 21.

Shading in the Florida Building Code - Energy

The urgent demand to conserve energy and reduce cooling operations in warm climates has re-opened the centuries-old, common sense practice of controlling solar heat gain through the use of shading. In the past, only overhangs and projections were typical methods of providing such shading. However, today modern materials and innovative designs can provide functional, and high performing shading features that are architecturally pleasing.

Well-placed shading can result in energy savings by reducing direct solar gain through windows. Peak electricity demand is also reduced by shading resulting in lower peak demand charges from utilities and reduced mechanical equipment costs, thereby contributing to a more sustainable building. Shading has the ability to reduce glare in an interior space without the need to lower shades or close blinds, which results in maximum natural daylighting and less use of artificial lighting. Shading existing fenestration (clear single or double glazed) may be a viable and economical option when compared to replacement with highest performing soft-coat, low-E windows and doors with glass.

The state of Florida has recognized that usefulness of shading by including the concept in State Statute 553.9061 addressing scheduled increases in thermal efficiency standards. This statute has directed "the Florida Building Commission …to…identify within code support and compliance documentation the specific building options and elements available to meet the energy performance goals established in subsection (1). Energy efficiency performance options and elements include, but are not limited to:

(see ITEM J) Shading devices, sunscreening materials, and overhangs.

Link:
http://www.leg.state.fl.us/statutes/index.cfm?mode=View%20Statutes&SubMenu=1&App_mode=Display_Statute&Search_String=553.9061+++++++Scheduled+increases+in+thermal+efficiency+standards&URL=0500-0599/0553/Sections/0553.9061.html

Having recognized this requirement in the state statue, this proposal offers options to comply, including high performance windows.

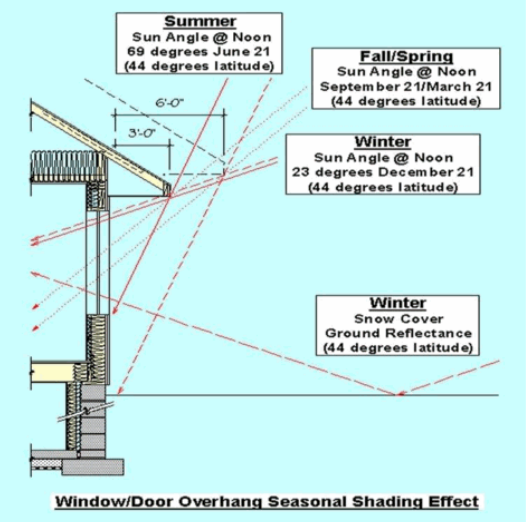
Regardless of the method used to for shading, many factors must be taken into consideration when using shading, such as:

- Geographic location (latitude and longitude)
- Building exposure to be shaded (south, east, or west)
- Time of year for complete or partial shading
- Critical time of day for shading
- The sun's position, azimuth, and altitude based on the location of the area to be shaded

Having definitions and multiple choices among the various broad shading options make the state statute enforceable.

The broad categories of permanent shading products are as follows:

Projections, such as overhangs, fins, eaves, and similar architectural features



Window/Door Overhang Seasonal Shading Effect

For projections to be effective, the projection must effectively shade the glazed opening. ASHRAE 90.1 provides calculation for a projection factor that offers the dimensions for proper shading from projections.

PF = A/B

PF = Projection factor (decimal).

A = Distance measured horizontally from the furthest continuous extremity of any overhang, eave, or permanently attached shading device to the vertical surface of the glazing.

B = Distance measured vertically from the bottom of the glazing to the underside of the overhang, eave, or permanently attached shading device.

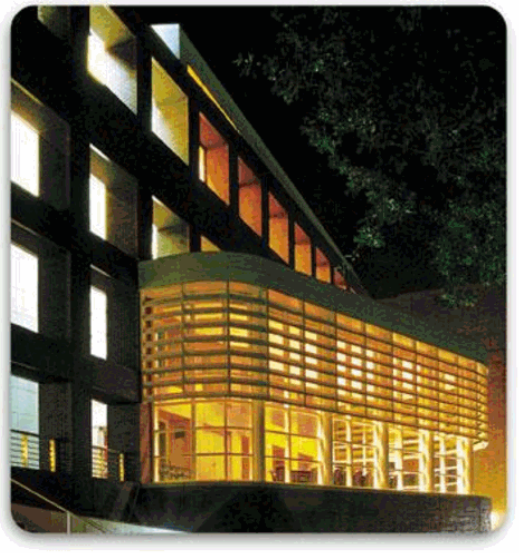
Projections

Sun Shades – cantilevered, horizontal line, and vertical line

Cantilevered. These sunshades are most effective on southern elevation during the midday hours when the sun is at its highest point in the sky. These systems are most often comprised of a series of slats or blades, available in many styles that provide a visually appealing application. The slats/blades allow for wind, and in some cases snow, to pass through. A suspended system distributes the load from the exterior sunshade to the building structure.

Cantilever Sunshade

Horizontal Line. Horizontal line sunshades are most effective when used on tall expanses of glass or on curtain walls where attaching a series of cantilevered sunshades on top of each other is not practical.



Horizontal Line Sunshade

Vertical Line. Vertical line sunshades are most effect on east and west elevations to block the low sun angles in the early morning and late afternoon. Typically, a hollow extruded shape sets either perpendicular to the building or at a slight rotation to maximize solar protection while providing occupants with the maximum amount of visibility to the outside.

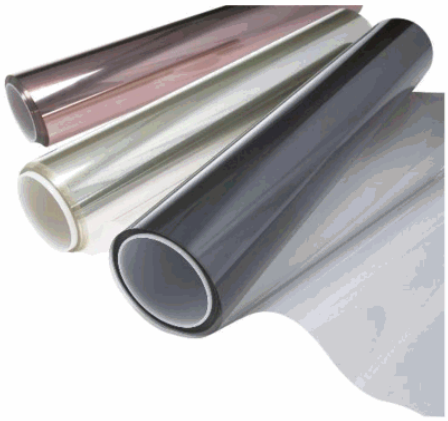
Vertical Line Sunshade

Window Film

Generally, window film provides specific personal and property protection from the effects of the sun as well as added safety and security in the events that result in broken glass. The efficiencies of solar control window films are closely related to local weather conditions, building orientation, window size, and other factors such as exterior shading conditions.

There are many types and constructions of solar control and safety window films. These films are considered in the building industry to be "retrofit" products; that is, products to be applied to existing buildings as opposed to use in new construction. In their simplest forms, window films are composed of a polyester substrate to which a scratch resistant coating is applied on one side; a mounting adhesive layer and a protective release liner is applied to the other side.

The effective life of window film will vary by the type of film, type of glass, window construction, compass orientation of glass, and in which part of the world the building is located. There are documented cases of film lasting 12 to 22 years or more in some instances.



Window Film

Louvers

Louvered sun screens provide shade and functional ventilation. Louvers can be designed with either vertical or horizontal blades and can be fixed or operational. Operational louvers can be designed to automatically move with the sun to reduce solar heat gain and glare, lower energy usage and maximize daylight. By effectively controlling the sun on all elevations, at all times of the day and throughout the year, controllable sunshades can significantly reduce the building's energy and capital equipment costs. These sunshades also prevent over or under shading so building occupants can always enjoy the benefits of natural daylight.

Operational Louvered Sunshade

Reason Statement for Mod 4309:

This modification recognizes the benefits provided by the permanent shading of fenestration in residential construction. The concept of shading has been in the 2000, 2003, 2006, and 2009 IECC for commercial buildings and has been proven to be very simple to calculate, fitting well into a prescriptive approach. This language has been derived from California's new mandatory Green Building Standards Code (CALGREEN), which encourages the use of all types of shading products and devices.

This modification allows for the use of permanent shading to meet the solar heat gain coefficient requirements of Table 402.1.1. Permanent exterior shading features, such as overhang and other projections, are allowed to be used in commercial construction as a prescriptive trade-off to meeting SHGC requirements within the code.

Allowing flexibility to meet the solar heat gain coefficient requirement through the use of proven shading alternatives will increase the usability of the code for the building and design community, while ensuring that the new fenestration is energy efficient. When credit for shading is permitted in the code, it encourages an integrated approach to building designs, energy use, construction materials, renewable resources, particularly as part of urban infrastructure, site and town planning and building design to be considered holistically. It also creates the opportunity for aesthetically pleasing and ingenious designs that might not otherwise be permitted. Shading in modern construction offers many possibilities, some yet to be fully explored.

EN4317

Date Submitted	4/1/2010	**Section**	402.3.6	**Proponent**	Amanda Hickman
Chapter	4	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation No Affirmative Recommendation with a Second
Commission Action Pending Review

Related Modifications

Mod 4309 - 402.3.2.1 Permanent Shading (compliance paths to meet SHGC requirements of Table 402.1.1)

Summary of Modification

The SHGC requirements for replacement fenestration in section 402.3.6 can be satisfied by new section 402.3.2.1 on Permanent Shading.

Rationale

see attached

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

There is no fiscal impact to enforcement of the code.

Impact to building and property owners relative to cost of compliance with code

It can potentially decrease the cost of code compliance by offering multiple options to accomplish energy savings.

Impact to industry relative to the cost of compliance with code

There may be a slight increase in cost to industry in order to show SHGC equivalency with Table 402.1.1. Some of these costs may include: design guides, product specifications, marketing materials and advanced product development.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

The correct use of shading encourages natural daylighting (as opposed to decreasing the window to wall ration or dark glass) which has been shown to improve productivity and better sense of well being.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Yes, this modification encourages product options and flexibility.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

No, this modification encourages product options and flexibility.

Does not degrade the effectiveness of the code

This modification will increase the usability and effectiveness of the code for the building and design community, while ensuring that the replacement fenestration is energy efficient.

2nd Comment Period 09/03/2010 - 10/18/2010

EN4317-G8

Proponent	Amanda Hickman	**Submitted**	10/18/2010	**Attachments**	Yes

Comment:

The Building Code Act of 2008 (HB 697) requires that energy efficiency performance goals be achieved through elements such as “shading devices, sunscreening materials, and overhangs.” This proposal is in line with that directive and we respectfully request that the TAC take a second look at the proposed language. Please see the attached rationale document.

2nd Comment Period 09/03/2010 - 10/18/2010

EN4317-G9

Proponent	Dwight Wilkes	**Submitted**	10/18/2010	**Attachments**	No

Comment:

The SHGC requirements for replacement fenestration in Section 402.3.6 can be satified by the new Section 402.3.2.1 on Permanent Shading.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4317-G1

Proponent Brian Sernulka **Submitted** 6/1/2010 **Attachments** No

Comment:

BCAP believes that the Florida Building Code should be efficient, simple, and enforceable. Any trade-offs or exceptions to code requirements should be narrowly defined so that energy efficiency is improved (or at least maintained), and building officials should not be forced to make on-the-spot decisions about component efficiency. Modifications 4307, 4309, 4317, 4327, and 4329 all fail these basic principles, and should be rejected.

Modification 4317 extends the same set of exceptions proposed in modification 4309, but to replacement windows. It suffers from many of the same enforcement and compliance issues. For example, Exception 4 requires “optimal overhangs” that ensure that south-facing glazing is “substantially exposed to direct sunlight at solar noon on December 21.” The modification does not explain what qualifies as “south-facing glazing” or how a builder or code official can calculate the impact of overhangs on windows. This presents additional problems for replacement windows, because it is impossible to alter the orientation of windows after the home has been built. The language of the exceptions will also create ambiguity for code officials. Terms such as “optimal” and “substantially exposed” are open to a wide variety of interpretations. We believe that the code should not create unnecessary exceptions if they would render the code more complicated or less enforceable. This modification should be rejected.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4317-G2

Proponent Garrett Stone **Submitted** 6/1/2010 **Attachments** No

Comment:

Modification 4317 raises the same issues as Modification 4309, and it should be rejected for the same reasons. (Issues with Modification 4309 will not be repeated here.) In the replacement context, it is worth noting that replacement window requirements only apply if the homeowner elects to replace the window. Nothing in the current code precludes homeowners from adding shading devices or films to existing windows. However, it does not make sense that where entire windows are being replaced that the code should encourage installation of inferior windows by creating exceptions to the code requirements. As a matter of policy, the code should encourage the installation of the right windows in the first place. For the reasons above, and for the same reasons listed in Modification 4309, this modification should be rejected.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4317-G3

Proponent Thomas Larson **Submitted** 6/1/2010 **Attachments** No

Comment:

SACE's main interest in code revision is to advance energy efficiency as fast and as much as possible, respecting full life-cycle cost effectiveness. Fla. Energy Code should be aligned with IECC 2009 & successive revisions as closely as possible, and contribute to 20% energy improvement over 2007. We offer comment on this proposal:

• The Energy Code Workgroup carefully reviewed the IECC and the Florida Building Code and combined them in a manner that ensured a reasonable level of flexibility for builders, while reaching a 20% improvement in energy efficiency over the 2004 FBC.

• These proposals introduce a long list of alternative products that are not guaranteed to meet the same level of efficiency as the low-SHGC windows proposed in the code. The proposals also introduce a high level of ambiguity into the code and could create problems for code officials.

• Many of the products or devices listed as exceptions to the low-SHGC window requirement are either less durable than windows or can be easily removed by homeowners. There is no reason to allow trade-offs between SHGC, which is rated and labeled to a uniform standard, and products that may not be rated at all.

• It is much easier and more cost effective to install the correct glazing products in the first place. These proposals would create incentives to install windows that are not appropriate for Florida’s climate.

• While well-designed shading can bring additional benefits to buildings, credit for shading is confined to computer-simulated compliance methods in which the precise impact can be measured.

• By contrast, the proposed set of alternatives allows shading (and a long list of other practices not typically allowed as trade-offs) to be directly traded off against SHGC.

• The benefits of low-SHGC windows are well settled. They result in lower energy bills, lower peak demand, and a lower environmental impact. These benefits should not be traded away for less certain benefits.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4317-G4

Proponent Eric Lacey **Submitted** 6/1/2010 **Attachments** No

Comment:

For most of the same reasons, RECA finds that Mod 4317, like Mods 4309, 4327 and 4329, defeats the primary objectives for energy code modifications in this code cycle – specifically, to improve the Florida code by: (1) tracking the nature, structure and provisions of the IECC, wherever possible; and (2) contributing to a 20% increase in energy efficiency compared to the 2004 Florida Building Code. Please see the comment on Mod 4309.

Mod 4317 makes even less sense than Mod 4309, given that it would apply to replacement fenestration. It would create an unnecessary loophole for replacement fenestration that would ultimately reduce the efficiency of the Florida Building Code:

• Section 13-601 of the 2007 Florida Building Code requires that all new fenestration installed as part of a renovation meet the code's requirement for U-factor and SHGC (without prescriptive exceptions for shading or overhangs). The current practice works and Mod 4317 represents a step backward in efficiency from that approach.

• Likewise, the IECC has contained a requirement for replacement windows since 1998, and has never allowed a prescriptive trade-off for permanent overhangs, much less all of the other, much less permanent options proposed in Mod 4317.

• Like the other similar proposed mods, this proposal is unenforceable. There is no explanation for how the code official should determine equivalence, what is an "optimal" overhang, and what qualifies as "substantially exposed" fenestration – in a replacement window context this is particularly problematic.

There is no reason to create this loophole. Mod 4317 should be rejected.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4317-G5

Proponent jeff inks **Submitted** 6/1/2010 **Attachments** No

Comment:

See comments on EN4309

1st Comment Period History 04/15/2010 - 06/01/2010

EN4317-G6

Proponent Harry Misuriello **Submitted** 6/1/2010 **Attachments** No

Comment:

Mod 4317 should not be approved. This is because it proposes a new requirement that is inconsistent with the IECC. Approval of this Mod would represent a departure from the objectives of this code development cycle which include alignment with the IECC structure and provisions. The IECC as published represents the predominant view of the nation's code officials concerning reasonable solar gain control that reduce energy usage and mitigate peak electrical demand in Florida's climate zones. Since the current Florida code requires replacement windows to perform the same as for new construction, this Mod also represents a weakening of the code. The proposed Mod also has compliance and enforceability issues in interpreting its complicated requirements. We urge the Task Group and Commission to disapprove this proposed Mod.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4317-G7

Proponent Jack Glenn **Submitted** 6/1/2010 **Attachments** No

Comment:

Original IECC language should be retained as no Florida specific reason is given for this change. If it is such a good idea, it should be submitted for national consideration and acceptance at the International Code Council.

Revise text as follows:

402.3.6 Replacement fenestration. Where some or all of an existing fenestration unit is replaced with a new fenestration product, including sash and glazing, the replacement fenestration unit shall meet the applicable requirements for U-factor and SHGC in Table 402.1.1. Where Table 402.1.1 requires a solar heat gain coefficient (SHGC), the requirements shall be met by section 402.3.2.1.

Revise text as follows:

402.3.6 Replacement fenestration. Where some or all of an existing fenestration unit is replaced with a new fenestration product, including sash and glazing, the replacement fenestration unit shall meet the applicable requirements for U-factor and SHGC in Table 402.1.1. Where Table 402.1.1 ~~requires~~ specifies a maximum solar heat gain coefficient (SHGC) for windows, the requirements shall be met by section 402.3.2.1.

Shading in the Florida Building Code - Energy

The urgent demand to conserve energy and reduce cooling operations in warm climates has re-opened the centuries-old, common sense practice of controlling solar heat gain through the use of shading. In the past, only overhangs and projections were typical methods of providing such shading. However, today modern materials and innovative designs can provide functional, and high performing shading features that are architecturally pleasing.

Well-placed shading can result in energy savings by reducing direct solar gain through windows. Peak electricity demand is also reduced by shading resulting in lower peak demand charges from utilities and reduced mechanical equipment costs, thereby contributing to a more sustainable building. Shading has the ability to reduce glare in an interior space without the need to lower shades or close blinds, which results in maximum natural daylighting and less use of artificial lighting. Shading existing fenestration (clear single or double glazed) may be a viable and economical option when compared to replacement with highest performing soft-coat, low-E windows and doors with glass.

The state of Florida has recognized that usefulness of shading by including the concept in State Statute 553.9061 addressing scheduled increases in thermal efficiency standards. This statute has directed "the Florida Building Commission …to…identify within code support and compliance documentation the specific building options and elements available to meet the energy performance goals established in subsection (1). Energy efficiency performance options and elements include, but are not limited to:

(see ITEM J) Shading devices, sunscreening materials, and overhangs.

Link:
http://www.leg.state.fl.us/statutes/index.cfm?mode=View%20Statutes&SubMenu=1&App_mode=Display_Statute&Search_String=553.9061+++++++Scheduled+increases+in+thermal+efficiency+standards&URL=0500-0599/0553/Sections/0553.9061.html

Having recognized this requirement in the state statue, this proposal offers options to comply, including high performance windows.

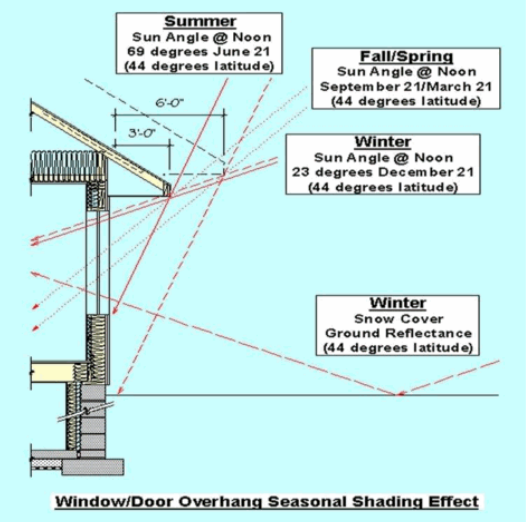
Regardless of the method used to for shading, many factors must be taken into consideration when using shading, such as:

- Geographic location (latitude and longitude)
- Building exposure to be shaded (south, east, or west)
- Time of year for complete or partial shading
- Critical time of day for shading
- The sun's position, azimuth, and altitude based on the location of the area to be shaded

Having definitions and multiple choices among the various broad shading options make the state statute enforceable.

The broad categories of permanent shading products are as follows:

Projections, such as overhangs, fins, eaves, and similar architectural features



Window/Door Overhang Seasonal Shading Effect

For projections to be effective, the projection must effectively shade the glazed opening. ASHRAE 90.1 provides calculation for a projection factor that offers the dimensions for proper shading from projections.

PF = A/B

PF = Projection factor (decimal).

A = Distance measured horizontally from the furthest continuous extremity of any overhang, eave, or permanently attached shading device to the vertical surface of the glazing.

B = Distance measured vertically from the bottom of the glazing to the underside of the overhang, eave, or permanently attached shading device.

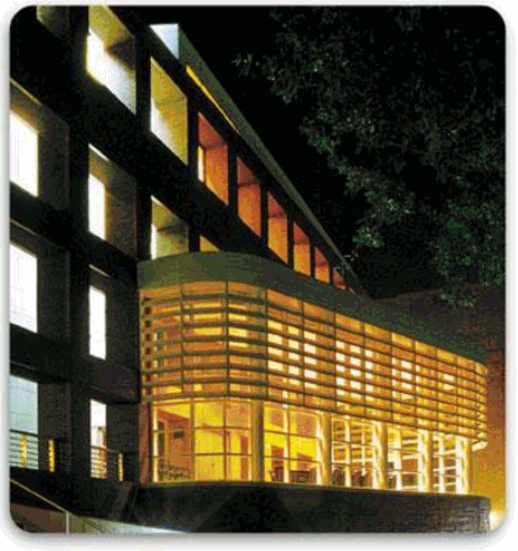
Projections

Sun Shades – cantilevered, horizontal line, and vertical line

Cantilevered. These sunshades are most effective on southern elevation during the midday hours when the sun is at its highest point in the sky. These systems are most often comprised of a series of slats or blades, available in many styles that provide a visually appealing application. The slats/blades allow for wind, and in some cases snow, to pass through. A suspended system distributes the load from the exterior sunshade to the building structure.

Cantilever Sunshade

Horizontal Line. Horizontal line sunshades are most effective when used on tall expanses of glass or on curtain walls where attaching a series of cantilevered sunshades on top of each other is not practical.



Horizontal Line Sunshade

Vertical Line. Vertical line sunshades are most effect on east and west elevations to block the low sun angles in the early morning and late afternoon. Typically, a hollow extruded shape sets either perpendicular to the building or at a slight rotation to maximize solar protection while providing occupants with the maximum amount of visibility to the outside.

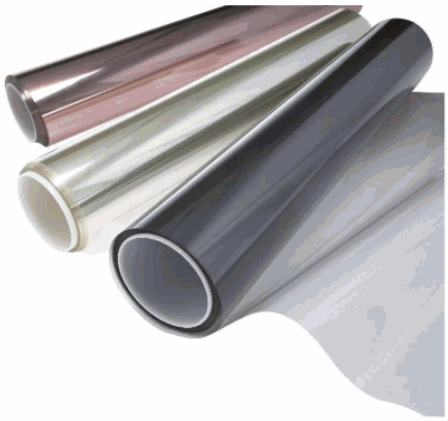
Vertical Line Sunshade

Window Film

Generally, window film provides specific personal and property protection from the effects of the sun as well as added safety and security in the events that result in broken glass. The efficiencies of solar control window films are closely related to local weather conditions, building orientation, window size, and other factors such as exterior shading conditions.

There are many types and constructions of solar control and safety window films. These films are considered in the building industry to be "retrofit" products; that is, products to be applied to existing buildings as opposed to use in new construction. In their simplest forms, window films are composed of a polyester substrate to which a scratch resistant coating is applied on one side; a mounting adhesive layer and a protective release liner is applied to the other side.

The effective life of window film will vary by the type of film, type of glass, window construction, compass orientation of glass, and in which part of the world the building is located. There are documented cases of film lasting 12 to 22 years or more in some instances.



Window Film

Louvers

Louvered sun screens provide shade and functional ventilation. Louvers can be designed with either vertical or horizontal blades and can be fixed or operational. Operational louvers can be designed to automatically move with the sun to reduce solar heat gain and glare, lower energy usage and maximize daylight. By effectively controlling the sun on all elevations, at all times of the day and throughout the year, controllable sunshades can significantly reduce the building's energy and capital equipment costs. These sunshades also prevent over or under shading so building occupants can always enjoy the benefits of natural daylight.

Operational Louvered Sunshade

Reason Statement for Mod 4317:

This modification recognizes the benefits provided by the permanent shading of fenestration in residential construction. The concept of shading has been in the 2000, 2003, 2006, and 2009 IECC for commercial buildings and has been proven to be very simple to calculate, fitting well into a prescriptive approach. This language has been derived from California's new mandatory Green Building Standards Code (CALGREEN), which encourages the use of all types of shading products and devices.

This modification allows for the use of permanent shading to meet the solar heat gain coefficient requirements of Table 402.1.1. Permanent exterior shading features, such as overhang and other projections, are allowed to be used in commercial construction as a prescriptive trade-off to meeting SHGC requirements within the code.

Allowing flexibility to meet the solar heat gain coefficient requirement through the use of proven shading alternatives will increase the usability of the code for the building and design community, while ensuring that the new fenestration is energy efficient. When credit for shading is permitted in the code, it encourages an integrated approach to building designs, energy use, construction materials, renewable resources, particularly as part of urban infrastructure, site and town planning and building design to be considered holistically. It also creates the opportunity for aesthetically pleasing and ingenious designs that might not otherwise be permitted. Shading in modern construction offers many possibilities, some yet to be fully explored.

Date Submitted	4/1/2010	**Section**	402.5	**Proponent**	Amanda Hickman
Chapter	4	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation No Affirmative Recommendation with a Second

Commission Action Pending Review

Related Modifications

Summary of Modification

Delete entire section: 402.5 Maximum fenestration U-factor and SHGC (Mandatory).

Rationale

see attached

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

There is no fiscal impact to enforcement of the code.

Impact to building and property owners relative to cost of compliance with code

This modification can potentially decrease the cost of code compliance. Deleting the “hard caps” will ensure that true tradeoffs are possible in the performance path, which will mitigate cost increases.

Impact to industry relative to the cost of compliance with code

There is no cost to industry due to this modification. Industry will have a level playing field through this modification.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

True trade-offs can now exist, thereby creating more flexible options that would benefit the general public.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Yes, this modification encourages product options and flexibility.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

No, this modification encourages product options and flexibility.

Does not degrade the effectiveness of the code

This modification will increase the usability and effectiveness of the code for the building and design community, by making the code less confusing and cumbersome.

2nd Comment Period 09/03/2010 - 10/18/2010

Proponent Amanda Hickman **Submitted** 10/18/2010 **Attachments** No

EN4320-G7

Comment:

These limits affect the ability to trade-off and also place unfair and unnecessary limits to design flexibility. These limits do not affect energy use, since the tradeoffs are to be energy neutral. Why should a constraint on design flexibility be placed without any resulting energy savings? Moreover, the ICC technical committee voted to delete this very language and remove the hard caps from the code. This was their reason statement “The provisions given in this section are artificial constraints on design flexibility. Tradeoffs are limited. The proponents claim that the building occupants will always turn up the thermostat are overstated.” We ask that you reconsider your previous action given the ICC technical committee’s vote this will not be in the next edition of code. Why get code officials used to something that will more than likely change next cycle and have the potential to cause confusion?

1st Comment Period History 04/15/2010 - 06/01/2010

Proponent Garrett Stone **Submitted** 6/1/2010 **Attachments** No

EN4320-G1

Comment:

Modification 4320 should be rejected because it removes an essential backstop that has been integral to the IECC’s simplified prescriptive path for the past several editions of the code. Every state that has adopted the 2004, 2006, or 2009 IECC has also adopted the fenestration trade-off maximums, despite repeated unsuccessful attempts by a few opponents to remove it at the state and national level. Based on previous code cycles, it appears that the proposal cited by the proponent to delete the maximums in the 2012 IECC is unlikely to survive at the Final Action Hearing – an identical proposal lost by an overwhelming margin last year.

High solar gain through windows leads directly to many problems – particularly occupant discomfort, higher electrical peak demand, additional expense and other problems associated with oversized HVAC systems, as well as too much energy use. Occupant discomfort due to high solar gain is particularly problematic. According the Efficient Windows Collaborative and DOE’s Lawrence Berkeley National Lab, the likelihood of occupant discomfort is almost 80% with a single pane clear window. This figure drops to almost 20% with a low solar gain window. Discomfort potentially leads to substantial additional energy use as the occupant reduces the thermostat to offset the discomfort. Windows that achieve a 0.50 SHGC or lower are widely available. In fact, of the 5.3 million window types listed in the NFRC database, over 89 % would not exceed a 0.40 SHGC, and we expect that percentage to be even higher for windows with a 0.50 SHGC or less.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4320-G2

Proponent Thomas Larson **Submitted** 6/1/2010 **Attachments** No

Comment:

The Southern Alliance for Clean Energy's primary interest in building code revision is to advance energy efficiency as fast and as much as possible, respecting full life-cycle cost effectiveness. We support alignment of Fla. Energy Code with IECC 2009 and successive revisions as closely as possible, and would foster each measure's contributions to 20% energy improvement over 2007. To that end, we offer comment on this proposed modification:

- Because of the growing impact of air conditioning on the power grid, and the associated environmental and financial costs to Florida and its citizens, it is reasonable to require low-solar gain windows in all homes.
- Low-SHGC windows will help reduce peak electric demand during periods of the year when electricity is scarce and exponentially more expensive than during non-peak periods. Utilities typically use older or less efficient peaking units to meet demand during these times, leading to more environmental degradation. The benefits of peak demand reduction are not achieved if SHGC is traded off against other items.
- The Technical Advisory Group kept this provision of the IECC in its draft because of the benefits of an SHGC “backstop” in the code. As Florida adapts its energy requirements to mirror the flexible structure of the IECC, it is important to include the IECC’s limitations.
- While the SHGC maximum of 0.50 is important, it is not an overly stringent requirement because it is nowhere near as efficient as the prescriptive SHGC requirement of 0.30. Technically speaking, it still allows 50% of the sun’s heat to enter through the windows. However, it sends a clear signal to code users that solar gain must be controlled, even when trade-offs are used.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4320-G3

Proponent Eric Lacey **Submitted** 6/1/2010 **Attachments** Yes

Comment:

Modification 4320 would delete an important provision included in the IECC since 2004 (in the IECC, the provision is important enough to be designated “mandatory”) and would be a substantial step backward in energy efficiency by completely removing the IECC’s protections against inefficient glazing in homes. The fenestration trade-off maximum for southern climate zones currently found in Section 402.5 of the 2009 IECC and the draft 2010 Florida Building Code is a simple requirement that all new homes (regardless of the compliance method) contain windows with some degree of solar protection – specifically that the weighted average window SHGC is required not to exceed 0.50. This means that the window, including the frame, must block 50% of the solar gain compared to no window at all. This is a very modest requirement compared with the much more aggressive proposed prescriptive SHGC value of 0.30 and allows substantial flexibility for individual windows since it applies on a weighted average basis to all windows.

RECA wholeheartedly supported the Task Group’s inclusion of the trade-off maximums in written and in-person comments during the drafting phase of the proposed code, and we continue to believe that this section is a crucial part of Florida’s energy requirements. The proponent has not demonstrated why it is necessary (or more energy efficient) to eliminate this important backstop. We recommend that Mod 4320 be rejected. (For a more complete analysis of this modification, see the attached document.)

1st Comment Period History 04/15/2010 - 06/01/2010

EN4320-G4

Proponent jeff inks **Submitted** 6/1/2010 **Attachments** No

Comment:

We recommend disapproval of this proposal. Removal of trade-off caps has not been justified. The inclusion of Section 402.5 ensures that appropriate and necessary limits are placed on trade-offs when applying them for compliance purposes and better ensures that the intended and required building energy performance is met.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4320-G5

Proponent Harry Misuriello **Submitted** 6/1/2010 **Attachments** No

Comment:

Mod 4320 should not be approved. This is because it eliminates an IECC requirement that has been included in at least 3 previous versions (2004, 2006 and 2009.) Approval of this Mod would represent a departure from the objectives of this code development cycle which include alignment with the IECC structure and provisions. Section 402.5 represents the predominant view of the nation’s code officials concerning reasonable window limitations that reduce energy usage and mitigate peak electrical demand in Florida’s climate zones. We urge the Task Group and Commission to disapprove this proposed Mod.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4320-G6

Proponent	Jack Glenn	Submitted	6/1/2010	Attachments	No

Comment:

While the change has been approved for inclusion in the 2012 I-code it should be considered in the next FBC edition until it is in the base code..

Delete without substitution:

~~**402.5 Maximum fenestration *U* factor and SHGC (Mandatory).** The area-weighted average maximum fenestration *U* factor permitted using trade-offs from Section 402.1.4 or 404 shall be 0.48 in Zones 4 and 5 and 0.40 in Zones 6 through 8 for vertical fenestration, and 0.75 in Zones 4 through 8 for skylights. The area-weighted average maximum fenestration SHGC permitted using trade-offs from Section 405 in Zones 1 through 3 shall be 0.50.~~

Disapprove Modification 4320

Modification 4320 should be disapproved because it would take a substantial step backward in energy efficiency by completely removing protections against inefficient glazing in homes. RECA wholeheartedly supported the inclusion if the trade-off maximums in written and in-person comments during the drafting phase of the proposed code, and we continue to believe that this section is a crucial part of Florida's energy requirements. The glazing trade-off maximums currently found in Section 402.5 of the 2009 IECC and the draft 2010 Florida Building Code are simple mandatory measures that ensure that all new homes contain high-quality, cost-effective windows that save energy and block unwanted solar gain in warmer climates.

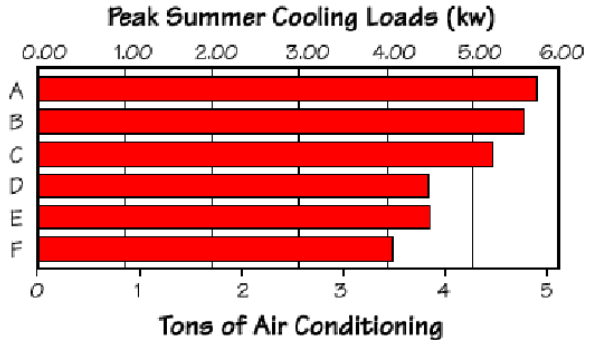
Every state that has adopted the 2004, 2006, and 2009 IECC has adopted these maximums without amendment. The maximums are seamlessly built into compliance software such as the Department of Energy's REScheck. The proponent of 4320 claims that the requirement is "difficult to explain and confuses most code users who often misinterpret it," but these simple, necessary backstops for trade-off programs are successfully being applied by builders and code officials in more than half the United States. The maximums have been repeatedly challenged over the last 10 years in the ICC process – and repeatedly upheld. Although the IECC Code Development Committee narrowly approved a proposal that would eliminate the maximums in 2012, that proposal must still go before the nation's building officials in October, 2/3 of whom voted in favor of keeping the window caps in the 2009 IECC.

Why Section 402.5 Matters in Florida

1. Quality windows, energy savings, and peak demand savings in Florida.

Efficient windows bring immediate cost savings to the builder who can downsize heating and cooling equipment, and bring long-term energy savings and greater comfort for consumers. On a larger scale, because low-SHGC windows reduce energy consumption during the peak summer months in warmer climates, high-quality windows can help reduce the strain on the electric grid and delay the need to build peak generation. Consumers also enjoy the reduced costs that come with economies of scale and market transformation. Because the proposed SHGC requirement in the Florida Building Code is 0.30 SHGC statewide, and the weighted average window maximums are set at 0.50 SHGC (over 166% of the baseline requirement), the maximums allow an enormous amount of trade-off capability. Glass block, garden windows, and other types of fenestration are not "technically illegal," as claimed by the proponent, but rather are still allowed under section 402.5, as long as the weighted average SHGC of all fenestration does not exceed a 0.50 SHGC. Fenestration maximums are a critical part of a well-functioning energy code because they discourage extreme trade-offs of windows that would result in long-term detriment to homeowners.

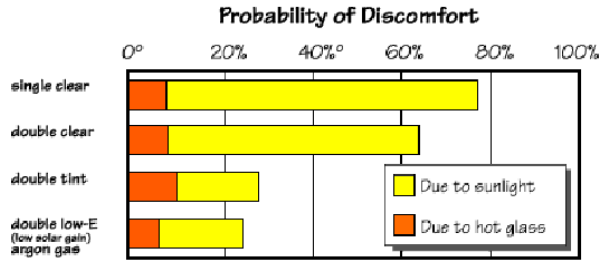
The following chart, developed by the U.S. Department of Energy's Lawrence Berkley National Laboratory (LBNL), which is found on the Efficient Window Collaborative (EWC) website (www.efficientwindows.org), shows the potential for saving peak demand for different window types. Window F is the low SHGC, low U-factor window that would satisfy the window maximums across the country (by contrast, window A is a single pane window). As is readily apparent, improved windows are crucial to lower peak cooling loads and smaller HVAC sizes (with lower costs).



2. More Comfortable Homes and Less Energy Use.

The energy code revolves around occupant comfort – any perceived energy savings will be instantly lost if an occupant is uncomfortable and adjusts the thermostat. Incremental changes in window efficiency can have a disproportionate impact on occupant comfort because even the most efficient windows are, at best, still only the equivalent of an R-3 wall. Hot spots created by high solar gain in the summer can force an occupant to adjust the thermostat to compensate (which will increase cooling loads at a time when electricity is scarce and exponentially more expensive).

The chart below, again produced by LBNL and displayed on the EWC website, shows the probability of discomfort during summer from sunlight and hot glass. The potential comfort problem from bad windows is even worse in the summer. The summertime probability of discomfort ranges from almost 80% with single clear and over 60% with double clear declining to almost 20% with windows as specified by Section 402.6.



In cooling-dominated climates, windows with low SHGC will protect against hot spots and occupant discomfort, and will make it less likely that occupants will need to adjust the thermostat and use more energy.

3. A Key Safety Net.

As shown above, the fenestration maximums serve an important role in ensuring residential energy efficiency. We recommend that Modification 4320 be rejected for the obvious negative impact it would have on the energy efficiency and quality of new homes. Without the protection of section 402.5, glazing values could be traded away to levels unacceptable in modern building practice. For example, windows with no solar protection could be used in Florida's hottest regions. Given the state's high priority for energy efficiency and the low cost (if any) of achieving these maximum values, it is imperative that Section 402.5 remain as currently written in the 2009 IECC.

Modification 4320 removes the most important restriction on fenestration trade-offs, and substantially increases the risk that a new home will be built with substandard windows to the long-term detriment of the homeowner. Given the cost of replacement windows, this is not an easy failure to remedy after the fact. Since this modification would bring about a radical change in the code, and would risk significant losses in energy efficiency statewide, we believe that the fenestration maximums should remain in the code.

Reason Statement for Modification 4320 – Deletion of "Hard Caps"

This modification was approved in Baltimore at the last ICC hearing by the energy committee. According to the committee reason statement for approving the proposal which deleted this section was: "The provisions given in this section are artificial constraints on design flexibility. Tradeoffs are limited."

Limits on fenestration U-factor and SHGC tradeoffs restrict ways by which code compliance can be achieved. By definition, trade-offs are energy neutral, and do not save energy, so this section is not necessary. This requirement is difficult to explain and confuses most code users who often misinterpret it.

The code would be better if it relied only on the U-factor and SHGC requirements in the main table. As previously reported in the last ICC code cycle, some common products, such as glass block and garden windows, never meet these "hard limits." In principle, a calculation or exemption would be required if more than a small area of these common products are used in new residences. Additions or renovations with significant areas of glass block or garden windows would be technically illegal.

Date Submitted	3/30/2010	**Section**	402	**Proponent**	Jeff Sonne
Chapter	4	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation No Affirmative Recommendation with a Second

Commission Action Pending Review

Related Modifications

- 402.2.1 Delete: "and the total UA..."
- 402.2.2 Delete: "and the total UA..."
- Table 402.1.3 note d. Delete: "U-factors for determining...air films"
- 402.3.3 Delete: "and the Total UA..."
- 402.3.4 Delete: "and the total UA..."

Summary of Modification

Eliminate the “Total UA Alternative” residential energy code compliance method described in section 402.1.1.3.

Rationale

Florida Solar Energy Center analysis shows that results using the Total UA Alternative method can vary significantly in equivalence from the other compliance methods provided by Section 402 and Section 405. Thus, the Total UA Alternative cannot be relied upon to provide equivalence to other Section 402 and Section 405 compliance methods.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

Eliminating a compliance method should reduce local code enforcement workload as it reduces the number of compliance methods that will have to be learned, maintained and enforced.

Impact to building and property owners relative to cost of compliance with code

Negligible; there are still multiple compliance methods available.

Impact to industry relative to the cost of compliance with code

Negligible; there are still multiple compliance methods available.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Public is benefited by elimination of non-equivalent energy code compliance methods.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Improves the code by eliminating a non-equivalent compliance method.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

Neutral—only concerns a code compliance method.

Does not degrade the effectiveness of the code

Improves code effectiveness by eliminating a non-equivalent compliance method.

2nd Comment Period 09/03/2010 - 10/18/2010

EN4080-G5

Proponent	Jeff Sonne	**Submitted**	10/18/2010	**Attachments**	Yes

Comment:

See attached file.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4080-G1

Proponent	Darrell Winters	**Submitted**	5/25/2010	**Attachments**	No

Comment:

Showing compliance using the total UA calculation is much simplier than the performance option, and the purchase of software is unnecessary. Eliminating the UA alternative would remove this option from builders. Having this as an alternative may improve code compliance among builders.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4080-G2

Proponent	Brian Sernulka	Submitted	6/1/2010	Attachments	No

Comment:

BCAP believes that the 2010 Florida Building Code should facilitate all phases of code compliance – including simplicity, flexibility, and enforceability. Because not every house is the same, the energy code must afford builders a reasonable level of flexibility, as long as energy efficiency is maintained. The Total UA Alternative has been effectively used for many years by builders who need some trade-off capability among thermal envelope components without having to go through the more complex simulated performance alternative.

The Total UA is more conducive to builder and code official training than the full performance option. Given ARRA's requirement of 90% compliance, Florida should ensure that reasonable compliance options are accessible to builders who are not inclined to learn all the elements of the performance option. We support the inclusion of the Total UA Alternative in the Florida Building Code, and urge disapproval of Modification 4080.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4080-G3

Proponent	Eric Lacey	Submitted	6/1/2010	Attachments	No

Comment:

The IECC offers three primary compliance methods with differing degrees of complexity – 1. A simple prescriptive list of components; 2. A more complex, but still relatively simple envelope-only UA trade-off calculation; 3. A more complex and comprehensive, dynamic performance calculation that includes all building components and systems. As a middle ground, the Total UA alternative affords builders a simple set of trade-offs among building envelope components without requiring them to use a more complex performance analysis.

While an argument can certainly be made that a UA trade-off approach is not absolutely necessary with a robust performance compliance path, a strong argument can be made that the relative ease of compliance via a UA calculation would lead to more actual compliance.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4080-G4

Proponent	jeff inks	Submitted	6/1/2010	Attachments	No

Comment:

We recommend disapproval of this proposal. Removal of the UA alternative has not been justified. The inclusion of the total UA alternative is an accepted, straightforward and reliable alternative means for demonstrating compliance. Eliminating it would needlessly force the use other more complicated and potentially costly methods to demonstrate the same compliance without adequate reason.

~~**402.1.1.3 Total UA alternative.** If the total building thermal envelope UA (sum of U-factor times assembly area) is less than or equal to the total UA resulting from using the U-factors in Table 402.1.3 (multiplied by the same assembly area as in the proposed building), the building shall be considered in compliance with Table 402.1.1. All other prescriptive criteria of Table 402.1, the prescriptive criteria in Section 402.1.5 and footnotes to Table 402.1.3 shall be met.The UA calculation shall be done using a method consistent with the ASHRAE Handbook of Fundamentals and shall include the thermal bridging effects of framing materials. The SHGC requirements shall be met in addition to UA compliance.~~

The Total UA Alternative compliance method is not equivalent to the prescriptive and performance methods. The Florida 2010 Energy Code Workgroup, in its September 3, 2009 report, strongly recommended that the Florida Energy Code should "require that compliance meets equivalent energy standard regardless of the compliance method." The Total UA Alternative does not comply with this standard but rather creates compliance loopholes that would allow for significantly poorer performing homes than the prescriptive and performance methods. Therefore, in accordance with the recommendations of the 2010 Energy Code Workgroup, the Total UA Alternative should not be allowed.

The Total UA Alternative is very sensitive to window U-Factor because windows are very poor insulators compared with opaque wall systems. While typical wall systems will have U-Factors between 0.07-0.10, even the best windows will have U-Factors in the range of 0.25-0.30 or at least three times the conductance of walls. In fact, for Florida's maximum window U-Factor of 0.65, the window is at least 6 times as conductive as a typical wall. As a result, and as you will see in the attached spreadsheet, the UA allowance for windows makes up more than 60% of the total UA allowance for the entire home. Thus, improving the U-Factor for windows from the maximum requirement 0.65 to 0.30 (an improvement of U-0.35!!), provides significantly more whole building UA credit than can be justified by any kind of detailed analysis. In fact, doing just this in the attached spreadsheet example, allows the home to pass the Total UA Alternative calculation with R-6 ceiling insulation!

And if one assumes the minimum ceiling insulation of R-19 along with these U-0.30 windows, the frame wall insulation can be reduced to R-3.25. Taking these two building configurations and analyzing them using EnergyGauge FlaRes 2008, we find that the home with the U-0.30 windows and R-6 ceiling insulation will not come close to reaching the performance standard established by the Legislature for the 2010 Code cycle. Figure 1 shows that this configuration results in an average e-Ratio across the state of approximately 0.95, or about 5% more efficient than the 2007 Florida Energy Code (where the e-Ratio equals 100 by definition) while the legislative requirement is 20% more efficient than the 2007 Florida Energy Code.

If one assumes that the Ceiling R-value may only be reduced to R-19 due to other code restrictions, then frame wall insulation may be reduced to R-3.25. This configuration results in an average statewide e-Ratio of 0.90, or 10% more efficient than the 2007 Florida Energy Code, falling short of the 2010 legislative requirement by 10%.

Furthermore, this analysis also finds, as earlier analyses have found, that homes in Florida are not nearly as sensitive to window U-Factor as the Total UA Alternative would imply. Figure 1 provides results from this analysis, showing both the sensitivity to changing the windows U-factor from 0.30 to 0.65 as well as the sensitivity of changing both the window U-factor in this way and simultaneously changing the ceiling insulation from R-6 to R-30, which is its minimum prescriptive requirement. The results show that Florida homes are much more sensitive to this ceiling insulation R-value change than to the window U-Factor change.

What happens if someone greatly exceeds typical wall insulation levels? With the Total UA Alternative, a builder could install R19 block walls and 0.65 windows with SHGC of 0.3 and R12 ceiling. While

passing the Total UA Alternative, it does not pass the 2010 code. That combination results in e-Ratios of 0.83 in Miami, 0.84 in Orlando, and 0.91 in Jacksonville.

This methodology will clearly violate the equivalence goal recommended by the 2010 Energy Code Workgroup and accepted by the Florida Building Commission. The prescriptive and performance methodologies avoid the shortcomings of the Total UA Alternative. Therefore, the total UA approach should not be permitted in Florida's energy code.

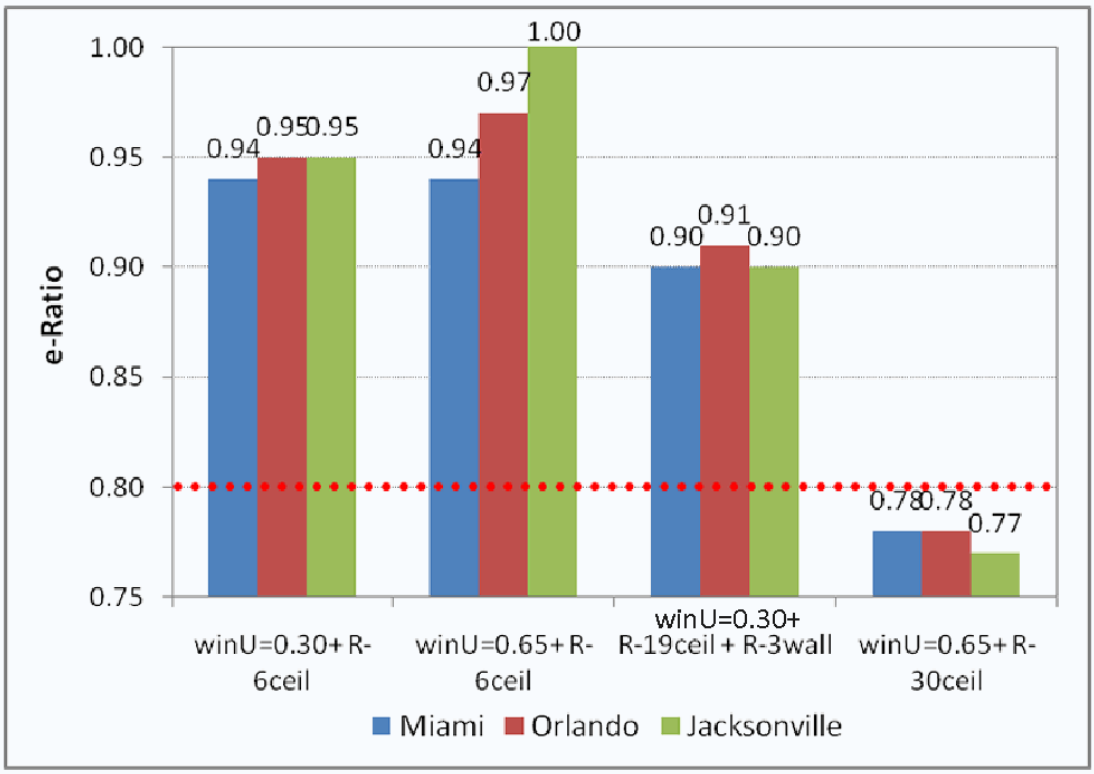


Figure 1. Results from EnergyGauge FlaRes 2008 Energy Code analysis showing that, while the U-0.30 window / R-6 ceiling insulation and the R-19 ceiling / R-3 walls configurations will show compliance with the Total UA Alternative, they will not come close to meeting the Florida Code maximum e-Ratio compliance requirement of 0.80 (red dotted line).

EN3892

Date Submitted	3/26/2010	**Section**	403.2.2.1	**Proponent**	Roger Sanders
Chapter	4	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation No Affirmative Recommendation with a Second

Commission Action Pending Review

Related Modifications

Summary of Modification

Add exception per compliance with section 405

Rationale

Compliance using Section 405 gives credit for duct testing overall energy use of the building provides options for achieving code compliance- there are many ways of gaining code compliance (achieving air tight ducts) so testing should not be mandatory.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

reduces required paperwork

Impact to building and property owners relative to cost of compliance with code

Reduces cost of delivered product

Impact to industry relative to the cost of compliance with code

simplifies compliance

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

No effect

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

provides equivalent performance and reduces cost

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

allows for for perscriptive compliance without mandatory testing and expense

Does not degrade the effectiveness of the code

provides alternate cost effective compliance

2nd Comment Period 09/03/2010 - 10/18/2010

Proponent Cheryl Harris **Submitted** 10/18/2010 **Attachments** No

EN3892-G2

Comment:

The Florida Refrigeration and Air Conditioning Contractors Association (FRACCA) has polled its 16 member Board of Directors representing approximately 350 licensed contractors in Florida. The consensus of the Board was to request that Mod EN3892 be revisited by the Energy TAC and approved for adoption.

We are in agreement with the author, Roger Sanders, that by including an exception allowing for meeting the requirements for compliance by the use of Section 405, Performance Method, the overall energy saving goal can be achieved and the high cost of mandatory testing can be avoided while keeping the flexibility inherent in the simulated performance alternative of Section 405. The overall energy saving intent of the Code would not be adversely impacted.

The mandatory leak-free duct requirement would remain in place for compliance by the Prescriptive Method.

2nd Comment Period 09/03/2010 - 10/18/2010

Proponent patrick ambrose **Submitted** 10/18/2010 **Attachments** No

EN3892-G3

Comment:

As a member of the Florida Refrigeration and Air Conditioning Contractors Association (FRACCA) and a licensed contractor I am requesting that Mod EN3892 be revisited by the Energy TAC and approved for adoption.

I am in agreement with the author, Roger Sanders, that by including an exception allowing for meeting the requirements for compliance by the use of Section 405, Performance Method, the overall energy saving goal can be achieved and the high cost of mandatory testing can be avoided while keeping the flexibility inherent in the simulated performance alternative of Section 405.

The mandatory leak-free duct requirement would remain in place for compliance by the Prescriptive Method.

The overall energy saving intent of the Code would not be adversely impacted.

2nd Comment Period 09/03/2010 - 10/18/2010

EN3892-G4

Proponent Hastings Brian **Submitted** 10/18/2010 **Attachments** No

Comment:

As a member of the Florida Refrigeration and Air Conditioning Contractors Association (FRACCA) and a licensed contractor I am requesting that Mod EN3892 be revisited by the Energy TAC and approved for adoption.

I am in agreement with the author, Roger Sanders, that by including an exception allowing for meeting the requirements for compliance by the use of Section 405, Performance Method, the overall energy saving goal can be achieved and the high cost of mandatory testing can be avoided while keeping the flexibility inherent in the simulated performance alternative of Section 405.

The mandatory leak-free duct requirement would remain in place for compliance by the Prescriptive Method.

The overall energy saving intent of the Code would not be adversely impacted.

2nd Comment Period 09/03/2010 - 10/18/2010

EN3892-G5

Proponent Scott Wilson **Submitted** 10/18/2010 **Attachments** No

Comment:

As a member of the Florida Refrigeration and Air Conditioning Contractors Association (FRACCA) and a licensed contractor I am requesting that Mod EN3892 be revisited by the Energy TAC and approved for adoption.

I am in agreement with the author, Roger Sanders, that by including an exception allowing for meeting the requirements for compliance by the use of Section 405, Performance Method, the overall energy saving goal can be achieved and the high cost of mandatory testing can be avoided while keeping the flexibility inherent in the simulated performance alternative of Section 405.

The mandatory leak-free duct requirement would remain in place for compliance by the Prescriptive Method.

The overall energy saving intent of the Code would not be adversely impacted.

2nd Comment Period 09/03/2010 - 10/18/2010

EN3892-G6

Proponent Spencer Artz **Submitted** 10/18/2010 **Attachments** No

Comment:

As a member of the Florida Refrigeration and Air Conditioning Contractors Association (FRACCA) and a licensed contractor I am requesting that Mod EN3892 be revisited by the Energy TAC and approved for adoption.

I am in agreement with the author, Roger Sanders, that by including an exception allowing for meeting the requirements for compliance by the use of Section 405, Performance Method, the overall energy saving goal can be achieved and the high cost of mandatory testing can be avoided while keeping the flexibility inherent in the simulated performance alternative of Section 405.

The mandatory leak-free duct requirement would remain in place for compliance by the Prescriptive Method.

The overall energy saving intent of the Code would not be adversely impacted

2nd Comment Period 09/03/2010 - 10/18/2010

EN3892-G7

Proponent Tom Worthmann **Submitted** 10/18/2010 **Attachments** No

Comment:

As a member of FRACCA and a liucensed mechanical contractor I am requesting that Mod EN3892 be revisited by the energy Tac committee and approved for adoption.

2nd Comment Period 09/03/2010 - 10/18/2010

EN3892-G8

Proponent Jaime DiDomenico **Submitted** 10/18/2010 **Attachments** No

Comment:

As a member of the Florida Refrigeration and Air Conditioning Contractors Association (FRACCA) and a licensed contractor I am requesting that Mod EN3892 be revisited by the Energy TAC and approved for adoption.

I am in agreement with the author, Roger Sanders, that by including an exception allowing for meeting the requirements for compliance by the use of Section 405, Performance Method, the overall energy saving goal can be achieved and the high cost of mandatory testing can be avoided while keeping the flexibility inherent in the simulated performance alternative of Section 405.

The mandatory leak-free duct requirement would remain in place for compliance by the Prescriptive Method.

The overall energy saving intent of the Code would not be adversely impacted.

2nd Comment Period 09/03/2010 - 10/18/2010

EN3892-G9

Proponent James Griffin **Submitted** 10/18/2010 **Attachments** No

Comment:

I'm a licensed contractor in Duval county and a member of the Florida Refrigeration Contractors Association (FRACCA). I respectfully request that the modification EN3892 be revisited by the Energy TAC and approved for adoption. I agree with the author, Roger Sanders that by including an exception allowing for meeting the requirements for compliance by the use of Section 405, performance Method, the overall energy savings goal can be achieved and the high cost of mandatory testing can be avoided while keeping the flexibility inherent in the simulated performance alternative of section 405. The mandatory leak-free duct requirement would remain in place for compliance by the perscriptive method. The overall energy saving intent of the code would not be adversely impacted. Thank you for your time.

1st Comment Period History 04/15/2010 - 06/01/2010

EN3892-G1

Proponent Jack Glenn **Submitted** 6/1/2010 **Attachments** No

Comment:

Original IECC language should be retained as no Florida specific reason is given for this change. Just because “it’s already there” is not justification of a Florida -specific need. This potentially changes the efficiency level of the IECC as adopted.

.**403.2.2.1 Duct tightness.** Duct tightness shall be verified by testing to ~~either of the following~~

1. ~~Post construction test:~~ ~~Leakage to outdoors shall be less than or equal to 8 cfm (226.5 L/min) per 100 ft^2 (9.29 m^2) of conditioned floor area or a total leakage less than or equal to 12 cfm (12 L/min) per 100 ft^2 (9.29 m^2) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.~~

2. ~~Rough-in test:~~ ~~Total leakage shall be less than or equal to 6 cfm (169.9 L/min) per 100 ft^2 (9.29 m^2) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the roughed-in system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 ft^2 (9.29 m^2) of conditioned floor area.~~

~~Exceptions:~~ ~~Duct tightness test is not required if the air handler and all ducts are located within conditioned space.~~ ASHRAE Standard 152. All ducts and air handlers shall be either located in conditioned space or tested by a Class 1 BERS rater to be "substantially leak free".

Exception: buildings complying by section 405

[Alternative text in red]

403.2.2.1 Duct tightness. Duct tightness shall be verified by testing to ~~either of the following~~

1. ~~Post construction test:~~ ~~Leakage to outdoors shall be less than or equal to 8 cfm (226.5 L/min) per 100 ft^2 (9.29 m^2) of conditioned floor area or a total leakage less than or equal to 12 cfm (12 L/min) per 100 ft^2 (9.29 m^2) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.~~

~~2. Rough in test:~~ ~~Total leakage shall be less than or equal to 6 cfm (169.9 L/min) per 100 ft^2 (9.29 m^2) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the roughed in system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 ft^2 (9.29 m^2) of conditioned floor area.~~

~~Exceptions:~~ ~~Duct tightness test is not required if the air handler and all ducts are located within conditioned space.~~ ASHRAE Standard 152 as modified by RESNET Formal Interpretation 2006-002. All ducts and air handlers shall be either located in conditioned space or tested by a Class 1 BERS rater to be "substantially leak free".

Exception: buildings complying by section 405

RESNET Residential Energy Services Network — Setting the STANDARD for QUALITY

RESNET Formal Interpretation 2006-002
Approved by the RESNET Board of Directors, February 26, 2006

Proponent:
RESNET Standing Technical Committee

Applies to:
2006 Mortgage Industry National Home Energy Rating Systems Standards
Table 303.4.1.(1), under "Thermal distribution systems"; footnote (n); and Appendix A, under "Air leakage (ducts)":

Interpretation: RESNET Duct Testing Procedure

Background
Table 2 in this document comprises a summary of a test procedure intended for use by Certified Raters in performing required field testing of the leakage of forced-air thermal distribution systems as part of a Confirmed Rating.

The *2006 Mortgage Industry National Home Energy Rating System Standards* specifies the use of ASHRAE Standard 152, with some exceptions (stated in Appendix A), for testing ducted distribution systems. The procedures outlined below and summarized in Table 2 are deemed by RESNET to be an approved implementation of the leakage testing procedures in ASHRAE 152 for the purpose of field testing of homes by Certified Raters to complete a confirmed HERS rating.

Rationale
The leakage testing procedures of ASHRAE Standard 152 were not necessarily designed for the practical application to field ratings, and some simplifications and default assumptions were necessary. There are requirements in 152 that, although appropriate for research purposes, can not always be met when testing homes in a production setting.

Buffer zones
For example, 152 requires that when pressurizing a house to 25 Pa, any unconditioned spaces containing ducts must be within 10 Pa of outside pressure. If this requirement isn't met, holes must be added between the space and outside until the requirement is met. This often can't be done in real houses. In addition it is not always possible to even measure the pressure in these spaces without cutting holes through finished surfaces. For these reasons it was decided that, whenever possible, these spaces should be opened to outside, but when not possible they should be left "as is" and no pressure measurement of these spaces would be required.

Plenum Pressure Measurements
The leakage to outside test procedure in ASHRAE 152 (Annex B) attempts to estimate the amount of duct leakage to outside and unconditioned spaces under normal operating conditions. This is done by first attempting to measure the leakage with a uniform pressure of 25 Pa across all the leaks to outside and unconditioned spaces. This leakage at 25 Pa is then adjusted for the fact that the pressure difference

Date Submitted	4/2/2010	**Section**	403.2.2.1	**Proponent**	Jack Glenn
Chapter	4	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation No Affirmative Recommendation with a Second

Commission Action Pending Review

Related Modifications

Summary of Modification

This modification reinstates the original air duct tightness provisions in the IECC.

Rationale

The current language inadvertently increases the efficiency of the code without proper hearing by the ENERGY TAC. It takes criteria that was previously a credit and makes it mandatory for all homes in Florida. Therefore, this is not a reconciliation issue between the IECC and FEC, but a true code change that should be heard by both the ENERGY TAC and full commission.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

No impact on local enforcement

Impact to building and property owners relative to cost of compliance with code

None

Impact to industry relative to the cost of compliance with code

None

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

No change

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Makes code consistent with the base code (IECC).

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

Does not discriminate

Does not degrade the effectiveness of the code

Does not degrade the code.

Alternate Language

2nd Comment Period 09/03/2010 - 10/18/2010

EN4463-A5

Proponent Arlene Stewart **Submitted** 10/18/2010 **Attachments** Yes

Rationale

Previous versions of the FBC have allowed mechanical engineers and testing and balancing agents to also conduct duct tests. However, duct testing protocol is not regularly included in basic training for these entities. Furthermore, the Governor's Energy Office HVAC Rebate program in September 2010 revealed other professionals that have equitable training and experience but who were not listed in the code and statute. These entities as well as test & balancing work outside of the current ove

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

Provides clarification and thus makes enforcement easier

Impact to building and property owners relative to cost of compliance with code

this provision should reduce the cost of compliance because potentially, there will be a greater number of duct testers available in the market place, creating more competition for services and reducing costs

Impact to industry relative to the cost of compliance with code

Existing raters may face more competition.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

yes. It is important that entities qualified for implementing code provisions demonstate competency in testing.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Yes, because it clarifies the basic competencies that a professional must demonstrate for the enforcement of this part of the code.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

No. It implements a Florida Statute as a basic criteria for all testing entities, thereby creating a level playing field among the industry

Does not degrade the effectiveness of the code

No, it sets a minimum competency threshold by cross referencing the Florida Statute that governs the certification of such individuals.

Alternate Language

2nd Comment Period 09/03/2010 - 10/18/2010

EN4463-A1

Proponent Jack Glenn **Submitted** 10/15/2010 **Attachments** Yes

Rationale

This is a clarification of the original submittal that the TAC found confusing. Upon review after TAC hearing, the confusion was identified in a strike through/underline error in the last line of the submitted text. The corrected underline/strikethrough is submitted here.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

No impact

Impact to building and property owners relative to cost of compliance with code

No impact

Impact to industry relative to the cost of compliance with code

No Impact

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

provides clarity, while promoting health, safety and welfare to the public.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Impraves the code by providing clarity

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

Does not discriminate

Does not degrade the effectiveness of the code

Does not degrade the code

2nd Comment Period 09/03/2010 - 10/18/2010

EN4463-G1

Proponent Thomas Allen **Submitted** 10/18/2010 **Attachments** No

Comment:

support Jack Glenn comments
This comment restores original IECC language. The base code, IECC 2009, was not designed to ASHRAE 152 and such reference should be removed. The Energy Workgroup that correlated the IECC with Florida Specific amendments provided no compelling Florida-specific reason to retain the ASHRAE Standard 152 test method. Moreover, correspondence from the Florida Solar Energy Center indicates that ASHRAE 152 is not the national consensus standard for duct leakage testing. Therefore, the criteria set out in the IECC language provides the direction enforcement officials, Class 1 BERS raters, HVAC contractors and Builders need on the exact circumstances under which this provision is qualified. This will assist in implementation and ensuring compliance with this new mandatory provision, reducing confusion.

403.2.2.1 Duct tightness. Duct tightness shall be verified by testing to either of the following

1.. Post construction test: Leakage to outdoors shall be less than or equal to 8 cfm (226.5 L/min) per 100 ft^2 (9.29 m^2) of *conditioned floor area* or a total leakage less than or equal to 12 cfm (12 L/min) per 100 ft^2 (9.29 m^2) of *conditioned floor area* when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.

2. Rough-in test: Total leakage shall be less than or equal to 6 cfm (169.9 L/min) per 100 ft^2 (9.29 m^2) of *conditioned floor area* when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the roughed-in system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 ft^2 (9.29 m^2) of *conditioned floor area*.

Exceptions: Duct tightness test is not required if the air handler and all ducts are located within *conditioned spacer*.

-

~~ASHRAE Standard 152.~~ All ducts and air handlers shall be either located in conditioned space or tested by a Class 1 BERS rater to be "substantially leak free".

403.2.2.1 Duct tightness. Duct tightness shall be verified by testing to either of the following:

1. Post construction test: Leakage to outdoors shall be less than or equal to 8 cfm (226.5 L/min) per 100 ft^2 (9.29 m^2) of conditioned floor area or a total leakage less than or equal to 12 cfm (12 L/min) per 100 ft^2 (9.29 m^2) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.

2. Rough-in test: Total leakage shall be less than or equal to 6 cfm (169.9 L/min) per 100 ft^2 (9.29 m^2) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the roughed-in system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 ft^2 (9.29 m^2) of conditioned floor area.

Exceptions: Duct tightness test is not required if the air handler and all ducts are located within conditioned space. ~~ASHRAE Standard 152~~. All ducts and air handlers shall be either located in conditioned space or tested by a Class 1 BERS rater. ~~to be "substantially leak free".~~

403.2.2.1 Duct Tightness. Duct tightness shall be verified by testing to ASHRAE Standard 152**.** All ducts and air handlers shall be either located in conditioned space or tested by a Class 1 BERS rater (or other entity who demonstrates duct testing competency equivalent to criteria found in F.S. 553.995) to be "substantially leak free".

Date Submitted	4/2/2010	**Section**	403.5.1	**Proponent**	Jack Glenn
Chapter	4	**Affects HVHZ**	No	**Attachments**	No

TAC Recommendation No Affirmative Recommendation with a Second

Commission Action Pending Review

Related Modifications

Summary of Modification

This restores original IECC language for ventilation.

Rationale

This modification removes the language and returns the code to original IECC language. This provision was out of the purview of the Workgroup because it adds criteria to the code, rather than reconciling language from the IECC and the Florida Energy Code. Therefore it needs to be heard by the Energy Technical Advisory Committee and the full Commission before adoption.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

No impact on local enforcement

Impact to building and property owners relative to cost of compliance with code

None

Impact to industry relative to the cost of compliance with code

None

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

No change

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Makes code consistent with the IECC

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

Does not discriminate

Does not degrade the effectiveness of the code

Does not degrade the code.

2nd Comment Period 09/03/2010 - 10/18/2010

EN4458-G1

Proponent	Arlene Stewart	**Submitted**	10/17/2010	**Attachments**	No

Comment:

This proposal should be reconsidered. It restores original IECC language to the correlated code.

403.5.1 Ventilation air. ~~Residential buildings designed to be operated at a positive indoor pressure or for mechanical ventilation shall meet the following criteria:~~

~~1. The design air change per hour minimums for residential buildings in ASHRAE 62, Ventilation for Acceptable Indoor Air Quality, shall be the maximum rates allowed for residential applications.~~

~~2. No ventilation or air conditioning system make up air shall be provided to conditioned space from attics, crawlspaces, attached enclosed arages or outdoor spaces adjacent to swimming pools or spas.~~

~~3. If ventilation air is drawn from enclosed space(s), then the walls of the space(s) from which air is drawn shall be insulated to a minimum of R 11 and the ceiling shall be insulated to a minimum of R 19, space permitting, or R 10 otherwise.~~

Date Submitted	3/26/2010	**Section**	405.6, Table B-1.1.2(1)	**Proponent**	Eric Lacey
Chapter	4	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation No Affirmative Recommendation with a Second

Commission Action Pending Review

Related Modifications

Summary of Modification

This proposal removes trade-offs that are not allowed under the 2009 IECC performance path, including the programmable thermostat credit, the cross-ventilation and whole house fan options, and an oversimplified credit for thermal storage mass.

Rationale

(See attachment for a detailed rationale.) This proposal removes trade-offs that are not allowed under the 2009 IECC performance path, including the programmable thermostat credit, the cross-ventilation and whole house fan options, and an oversimplified credit for thermal storage mass.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

This will simplify code enforcement by removing unnecessary trade-offs.

Impact to building and property owners relative to cost of compliance with code

There should be little or no cost impact, since there are many more options for trade-offs still in the performance path.

Impact to industry relative to the cost of compliance with code

There should be little or no cost impact to industry, since there are many more options for trade-offs still in the performance path.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

This proposal will ensure that homes are built to a more consistent, more energy efficient standard.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

The proposal will improve the code by eliminating unnecessary trade-off credits.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

The proposal does not discriminate against any product.

Does not degrade the effectiveness of the code

The proposal will enhance the effectiveness of the code.

2nd Comment Period 09/03/2010 - 10/18/2010

EN3947-G3

Proponent	Arlene Stewart	**Submitted**	10/17/2010	**Attachments**	No

Comment:

TAC Action should be overturned because the language found in the correlated energy code is not in the IECC and no Florida-specific climate related justification was identified by the Workgroup. This is a hold over from the existing Florida Energy Code that is not directly climate related. Concept and language should be submitted to the IECC as part of the ICC code development process.

1st Comment Period History 04/15/2010 - 06/01/2010

EN3947-G1

Proponent	Michael Nau	**Submitted**	5/18/2010	**Attachments**	No

Comment:

There shouldn't be any caps added to the performance based program. The performance method in its very nature enhances creative ways of saving energy. This programs provides for inovation in energy performance and will always find the most economical method for meeting the energy budget without wasting unnecessary money on minimums that don't provide true energy savings. It would be a hardship for a builder to spend excess money on something that provides no additional return both in money and energy.

1st Comment Period History 04/15/2010 - 06/01/2010

EN3947-G2

Proponent	Joe Nebbia	**Submitted**	5/25/2010	**Attachments**	No

Comment:

The performance path, by it's nature measures the total energy performance of a building as a system. Adding energy saving options to this measurement in no way weakens the efficiency of the code as claimed in this rationale.

SECTION 405

SIMULATED PERFORMANCE ALTERNATIVE (Performance)

405.6 Requirements specific to credit options. Credit may be claimed in the software compliance calculation for technologies that meet prescriptive criteria specified below for various options.

~~**405.6.4 Installation criteria for homes using the cross ventilation option.** The cross ventilation option may be used if the following criteria have been met.~~

~~1. Operable aperture areas totaling a minimum of 12 percent of the floor area of the room shall be provided for all primary living areas and main bedrooms.~~

~~2. Insect screens shall be provided for all windows and doors to be considered operable aperture area. All screened entry doors and interior doors in the ventilated areas shall be provided with either (1) mechanically attached door stops (or similar devices) to hold the door in an open position or (2) operable louvers.~~

~~3. The total aperture area shall be provided by a minimum of two distinct windows. Each window shall provide not more than 70 percent of the total aperture area. The windows (or sliding glass doors) shall be placed in adjacent or opposite walls. The windows may be placed on a single outside wall if wing walls are used.~~

~~4. Where wing walls are included in the building design for ventilation purposes, they shall be placed between windows to create a high pressure and a low pressure zone on each window. Wing walls shall extend from the ground to eve height, be located on the windward side of the building, and extend outward from the building a distance at least equal to one half the width of the window. NOTE: This technique is effective only for areas which experience significant and continuous winds during the cooling months.~~

~~**405.6.5 Installation criteria for homes using the whole house fan option.** The whole house fan option may be used if the following criteria have been met.~~

~~1. The whole house fan has been sized to provide a minimum of 20 air changes per hour for the entire house.~~

~~2. The fan installed shall have a free air cfm rating of at least three times the square footage of the conditioned area of the house.~~

~~3. To ensure adequate air exhaust, the house attic shall have gable, ridge or wind turbine vents whose total opening area is equal to four times the ceiling cutout area for the whole house fan. Soffit vents shall not be included in the exhaust vent area.~~

NORMATIVE APPENDIX B

CRITERIA FOR COMPUTER MODELING

FOR PERFORMANCE-BASED CODE COMPLIANCE

TABLE B-1.1.2(1)

SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

Building Component	Standard Reference Design	Proposed Design
Glazing [a]	Total area[b] 18% of the conditioned floor area Orientation: equally distributed to four (4) cardinal compass orientations (N,E,S&W) U-factor: 0.75 SHGC:0.40 Interior shade coefficient Summer = 0.70 Winter = 0.85[c] External shading: none	As proposed
		As proposed
		As proposed
		As proposed

		As proposed
		As proposed
		As proposed
Thermostat	Type: manual	Type: Same As proposed
	Temperature setpoints: cooling temperature set point = 78 F; heating temperature set point = 68 F	Temperature setpoints: same as the Standar Reference Design~~, except when programma thermostats are used~~.

(c) ~~For fenestrations facing within 15 degrees of due south that are directly coupled to thermal storage mass, the winter interior shade coefficient shall be permitted to increase to 0.95 in the proposed design.~~

(Portions of table and footnotes not shown shall remain unchanged.)

Remove Excessive Trade-Offs

This proposal removes trade-offs that are not allowed under the 2009 IECC performance path and which would serve to weaken the code's overall efficiency. Our understanding of House Bill 7135 is that the Legislature intended to adopt the IECC's overall structure and stringency, and that elements carried over from previous editions of the Florida Building Code should not serve to weaken the efficiency of the 2010 code. We have identified a few credits that would not be allowed under the 2009 IECC performance path, and as such, are weakening amendments that should be rejected.

1. Programmable Thermostat Credit. Section 403.1.1 of the 2009 IECC and Section 403.1.1 of the draft 2010 Florida Building Code both already require a programmable thermostat in buildings where the primary heating system is a forced-air furnace. It does not make sense to apply an additional credit for installing a programmable thermostat in Normative Appendix B. Mandatory requirements should not be counted as trade-off credit under the performance path. If the intent is to require programmable thermostats in more scenarios, the Commission should consider the language from proposal EC101, submitted for the 2012 IECC:

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

2. Cross-Ventilation Option and Whole House Fan Option. These two credits are currently not available under the 2009 IECC performance path, and should be deleted from the 2010 Florida Building Code. Efficiency in thermal building envelope components should not be traded off against building elements that require regular user operation. The energy savings from cross-ventilation and a whole house fan are questionable because they depend upon an operator that is well-informed and present during specific times of the day. While these may be good elements to incorporate into the design of the home, they should not be traded away for more constant energy savers.

3. Interior Shade Coefficient. Footnote (c) allows a substantial increase in the assumed winter shading coefficient where fenestration facing "15 degrees of due south that are directly coupled to thermal storage mass." This is an oversimplified trade-off that is not allowed by the 2009 IECC. Although "thermal storage mass" is incorporated into the Internal Mass calculation in the IECC performance path, it is not used as a uniform trade-off amount as proposed in footnote (c) of the current draft of the 2010 Florida Building Code. It is not clear just how much or what type of thermal mass is required, or whether the definition of thermal storage mass in footnote (g) even applies. (The term does not appear in the definitions.) The effect of the trade-off credit is a very specific (and substantial) increase in the amount of solar heat gain that is allowed into the building.

This is very likely to result in a *decrease* in energy efficiency, and it should be removed from the code.

Date Submitted	3/26/2010	**Section**	502.1.1.1(1)&(2)	**Proponent**	Roger LeBrun
Chapter	5	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation No Affirmative Recommendation with a Second

Commission Action Pending Review

Related Modifications

Summary of Modification

Coordinate Skylight U-Factor and SHGC requirements with ASHRAE 90.1-2007, in general.

Rationale

ASHRAE has recognized that the value of skylights is the light they provide. Reducing SHGC below 0.35 makes it less likely that sufficient daylight can be transmitted to allow artificial lighting to be switched off. The previous limit of 0.19 SHGC prevents unit skylights and Low-E glass skylights from being used, unless they are triple glazed.
The U-factor (U-value) change is merely to be fully consistent with the latest ASHRAE 90.1-2007 Table 5.5-1.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

Should aid enforcement, since some labeled products could now be used.

Impact to building and property owners relative to cost of compliance with code

No impact.

Impact to industry relative to the cost of compliance with code

No impact.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Allows the use of more natural daylight, which many studies show has beneficial effects on humans.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Users would have more options when selecting complying products.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

Removes discriminating limits that would prevent most types of skylights from use in covered structures.

Does not degrade the effectiveness of the code

In non-residential construction, potential lighting energy savings due to sufficient daylight would be more difficult to achieve unless this proposed change is adopted.

Alternate Language

2nd Comment Period 09/03/2010 - 10/18/2010

EN3919-A1

Proponent Roger LeBrun **Submitted** 10/18/2010 **Attachments** Yes

Rationale

Rather than use the ASHRAE 90.1-2007 values as originally proposed, the TAC is advised to consider using the 2010 ENERGY STAR criteria for skylights in the Southern Zone, which provides sufficient light to allow electric lights to be switched off.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

Products carrying an ENERGY STAR label are easy to independently identify and verify.

Impact to building and property owners relative to cost of compliance with code

Fewer square feet of skylight will provide sufficient light, thereby reducing the heat transfer through the skylight, and the initial and operating cost of using skylights to provide daylight.

Impact to industry relative to the cost of compliance with code

No impact, as many of these products are readily available in Florida.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Skylights are the preferred source of daylight, which numerous studies show has beneficial effects on human health and productivity

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Provides many more options for compliance with the affected tables. Furthers the goal of higher energy efficiency in the new code, since lighting is a high percentage of commercial building energy consumption and the daylight provided reduces peak load.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

Removes existing unreasonable discriminatory limits, that were originally based on poor understanding of overall energy impacts of skylighting. ASHRAE has now recognized this and changed their standards similarly.

Does not degrade the effectiveness of the code

Daylight harvesting will be enhanced with this change.

TABLE 502.1.1.1 (1)

ENVELOPE PRESCRIPTIVE MEASURES FOR SHELL BUILDINGS[1,2]

Skylights:	
SHGC	<= ~~0.19~~ 0.35
Skylight U-value	<= ~~1.36~~ 0.75

(portions not changed remain)

-

TABLE 502.1.1.1 (2)

ENVELOPE PRESCRIPTIVE MEASURES FOR RENOVATIONS AND ALTERATIONS[1]

-

Skylights:	
SHGC	<= ~~0.19~~ 0.35
Skylight U-value	<=~~1.36~~ 0.75

(portions not changed remain)

TABLE 502.1.1.1(1)

ENVELOPE PRESCRIPTIVE MEASURES FOR SHELL BUILDINGS

Skylights:	
SHGC	<=~~0.35~~ 0.30
U-value	<=~~0.75~~ 0.70

(portions not shown remain unchanged)

TABLE 502.1.1.1(2)

ENVELOPE PRESCRIPTIVE MEASURES FOR RENOVATIONS AND ALTERATIONS

Skylights:	
SHGC	<=~~0.35~~ 0.30
U-value	<=~~0.75~~ 0.70

(portions not shown remain unchanged)

Date Submitted	4/1/2010	**Section**	502.2.5.1.3 (New)	**Proponent**	Amanda Hickman
Chapter	5	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation No Affirmative Recommendation with a Second

Commission Action Pending Review

Related Modifications

Mod 4329 - 502.2.5.1 Shell buildings, renovations and alterations can comply with this new section.

Summary of Modification

Adds a new section: 502.2.5.1.3 on Permanent Shading through different compliance paths on how to meet the requirements of Table 502.1.1.1.

Rationale

See attached

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

There is no fiscal impact to enforcement of the code.

Impact to building and property owners relative to cost of compliance with code

It can potentially decrease the cost of code compliance by offering multiple options to accomplish energy savings.

Impact to industry relative to the cost of compliance with code

There may be a slight increase in cost to industry in order to show SHGC equivalency with Table 402.1.1. Some of these costs may include: design guides, product specifications, marketing materials and advanced product development.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

The correct use of shading encourages natural daylighting (as opposed to decreasing the window to wall ration or dark glass) which has been shown to improve productivity and better sense of well being.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Yes, this modification encourages product options and flexibility.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

No, this modification encourages product options and flexibility.

Does not degrade the effectiveness of the code

This modification will increase the usability and effectiveness of the code for the building and design community, while ensuring that the new fenestration is energy efficient.

2nd Comment Period 09/03/2010 - 10/18/2010

Proponent Amanda Hickman **Submitted** 10/18/2010 **Attachments** Yes

EN4327-G7

Comment:

The Building Code Act of 2008 (HB 697) requires that energy efficiency performance goals be achieved through elements such as “shading devices, sunscreening materials, and overhangs.” This proposal is in line with that directive and we respectfully request that the TAC take a second look at the proposed language. Please see the attached rationale document.

1st Comment Period History 04/15/2010 - 06/01/2010

Proponent Brian Sernulka **Submitted** 6/1/2010 **Attachments** No

EN4327-G1

Comment:

Modification 4327 creates three new exceptions to the fenestration SHGC requirement in commercial building. The modification is unnecessary and does not bring the benefits outlined in the supporting statement. The commercial chapter of the 2009 IECC and ASHRAE 90.1-2010 contain very narrow, calculated methods for calculating the effects of projection factor on fenestration. To the extent that the Florida Building Code uses projection factor trade-offs, this is the most reasonable way to include them.
Modification 4327 goes beyond the current projection factor trade-offs by adding a list of open-ended exceptions to the fenestration SHGC requirements. Although the proponent claims that this proposal would “increase the usability of the code for the building and design community,” it actually creates the same compliance and enforcement problems as modification 4309, and it would not yield any additional energy efficiency.
The reason statement also conflicts with the likely outcome of the modification. Although the proponent argues that “the correct use of shading encourages natural daylighting,” the proposal (by referencing the definition of “permanent shading device” proposed in Modification 4307) would actually encourage the use of window films that can cut substantially into the amount of daylight entering the building. While the proponent’s reason statement primarily addresses overhangs, the language of the modification goes well beyond the use of overhangs and creates a long list of potential exceptions to the SHGC requirement. We recommend disapproval of Modification 4327.

1st Comment Period History 04/15/2010 - 06/01/2010

Proponent Garrett Stone **Submitted** 6/1/2010 **Attachments** No

EN4327-G2

Comment:

Modification 4327 contains many of the same problems of Modifications 4309 and 4317 and should also be rejected. The long list of exceptions to the SHGC requirement makes no more sense in a commercial setting than in a residential setting.
Although the residential chapter of the IECC allows no prescriptive SHGC trade-offs for overhangs, the commercial chapter of the IECC and ASHRAE 90.1 allow a limited amount of trading between the projection factor of overhangs and SHGC in the prescriptive path. However, that alternative is narrowly limited to overhangs and the calculation is explicitly defined within the codes. The language of 4327, by contrast, establishes an extremely broad set of exceptions going well beyond overhangs that will undercut crucial SHGC requirements, and does not adequately explain how a builder or code official should determine equivalence among the various shading alternatives. What overhangs are “optimal” may vary greatly from one designer to another, unless the term is defined in the code. Similarly, “south-facing” is subject to a wide interpretation. These terms go well beyond the projection factor calculation that is rigidly defined in the current model codes for commercial fenestration, and they reduce the level of clarity in the code. For these reasons, we believe Modification 4327 should be disapproved.

1st Comment Period History 04/15/2010 - 06/01/2010

Proponent Thomas Larson **Submitted** 6/1/2010 **Attachments** No

EN4327-G3

Comment:

SACE's main interest in code revision is to advance energy efficiency as fast and as much as possible, respecting full life-cycle cost effectiveness. Fla. Energy Code should be aligned with IECC 2009 & successive revisions as closely as possible, and contribute to 20% energy improvement over 2007. We offer comment on this proposal:
• The Energy Code Workgroup carefully reviewed the IECC and the Florida Building Code and combined them in a manner that ensured a reasonable level of flexibility for builders, while reaching a 20% improvement in energy efficiency over the 2004 FBC.
• These proposals introduce a long list of alternative products that are not guaranteed to meet the same level of efficiency as the low-SHGC windows proposed in the code. The proposals also introduce a high level of ambiguity into the code and could create problems for code officials.
• Many of the products or devices listed as exceptions to the low-SHGC window requirement are either less durable than windows or can be easily removed by homeowners. There is no reason to allow trade-offs between SHGC, which is rated and labeled to a uniform standard, and products that may not be rated at all.
• It is much easier and more cost effective to install the correct glazing products in the first place. These proposals would create incentives to install windows that are not appropriate for Florida’s climate.
• While well-designed shading can bring additional benefits to buildings, credit for shading is confined to computer-simulated compliance methods in which the precise impact can be measured.
• By contrast, the proposed set of alternatives allows shading (and a long list of other practices not typically allowed as trade-offs) to be directly traded off against SHGC.
• The benefits of low-SHGC windows are well settled. They result in lower energy bills, lower peak demand, and a lower environmental impact. These benefits should not be traded away for less certain benefits.

1st Comment Period History 04/15/2010 - 06/01/2010

Proponent Eric Lacey **Submitted** 6/1/2010 **Attachments** No

EN4327-G4

Comment:

Mod 4327 suffers from many of the same problems as Mods 4309, 4317 and 4329, but also presents issues unique to the commercial setting. Although the IECC and ASHRAE Standard 90.1 both allow a prescriptive projection factor trade-off only for commercial buildings, that trade-off only applies to overhangs and is clearly defined. If the Commission intends to incorporate a projection factor trade-off in commercial construction, we recommend that the exception stick to the more limited approach of either ASHRAE or IECC.
Mod 4327 should be rejected because it creates an almost open-ended list of SHGC trade-offs without any demonstration that the trade-offs are equivalent. Although terms like “adherent shading material or device” are not defined, we assume this is intended to include window films. No other state or national energy code that we are aware of contains SHGC trade-offs for window films or for an “adherent shading material or device.” Mod 4327 contains terminology that is not appropriate for mandatory code, and it would place code officials in the difficult position of determining what qualifies for the trade-off. Terms such as “optimal,” “equivalent” and “substantially exposed to direct sunlight” are not enforceable and will create liability issues for code officials and builders. Because window SHGC can be objectively determined and labeled, easily verified by building officials, and consistently installed by builders, there is no reason to create this loophole. Mod 4327 should be rejected.

1st Comment Period History 04/15/2010 - 06/01/2010

Proponent jeff inks **Submitted** 6/1/2010 **Attachments** No

EN4327-G5

Comment:

We recommend disapproval of this proposal. Prescriptive requirements for permanent shading should be considered much more thoroughly if they are to be included in the code, if at all. Permanent shading is not a prescriptive attribute for which selecting an option from a limited set of provisions can be relied upon to implement it correctly and effectively. There are many factors that must be carefully considered in order to do so, and if implemented incorrectly, can result in less efficient building operation and greater energy consumption. Providing prescriptive permanent shading options is also not necessary to achieve the state’s objective of increasing the stringency of the Florida 2010 energy code by 20%.

1st Comment Period History 04/15/2010 - 06/01/2010

Proponent Harry Misuriello **Submitted** 6/1/2010 **Attachments** No

EN4327-G6

Comment:

Mod 4327 should not be approved. This is because it proposes SHGC exceptions and trade-offs that are not included in the IECC. Approval of this Mod would represent a departure from the objectives of this code development cycle which include alignment with the IECC structure and provisions. The IECC as published represents the predominant view of the nation's code officials concerning reasonable solar gain control that reduce energy usage and mitigate peak electrical demand in Florida's climate zones. The proposed Mod will also be much different than the comparable provisions in ASHRAE Standard 90.1. Both the IECC and ASHRAE approached are limited to permanent overhangs with well defined projection factors and represent a good public policy solution to offer design flexibility, yet achieve energy savings. The proposed Mod's energy savings are uncertain and undocumented. The proposed Mod also has compliance and enforceability issues in interpreting its complicated requirements. We urge the Task Group and Commission to disapprove this proposed Mod.

Add new text as follows:

502.2.5.1.3 Permanent Shading. Where Table 502.1.1.1 requires a solar heat gain coefficient (SHGC), the requirements shall be met by either:

1. Installing fenestration products that have an area weighted average SHGC equal to or lower than those shown in Table 502.1.1.1, or

2. A permanent shading device, such as, but not limited to, an exterior louver that provides the equivalent solar heat gain coefficient as required in Table 502.1.1.1. Exterior shading devices must be permanently attached to the outside of the structure with fasteners that require additional tools or equipment to remove (as opposed to clips, hooks, latches, snaps, or ties), or

3. A combination of adherent shading material or device and fenestration product to achieve the equivalent solar heat gain coefficient as required in Table 502.1.1.1.

4. For south-facing glazing by optimal overhangs constructed or installed so that the south-facing glazing is fully shaded at solar noon on August 21 and substantially exposed to direct sunlight at solar noon on December 21.

Add new text as follows:

502.2.5.1.3 Permanent WindowShading. Where Table 502.1.1.1 requires a window solar heat gain coefficient (SHGC), the requirements shall be met by either:

1. Installing ~~fenestration products~~ windows that have an area weighted average SHGC equal to or lower than that shown in Table 502.1.1.1, or

2. ~~A~~ Utilizing a permanent shading device, such as, but not limited to, an exterior louver that provides the equivalent solar heat gain coefficient as required in Table 402.1.1. ~~Exterior~~ Such shading devices must be permanently attached to the outside of the structure with fasteners that require additional tools or equipment to remove (as opposed to clips, hooks, latches, snaps, or ties), or

3. ~~A~~ Utilizing a combination of adherent shading material or device and ~~fenestration product~~ window to achieve the equivalent solar heat gain coefficient as required in Table 502.1.1.1

~~4. For south-facing glazing by optimal o~~Overhangs shall be constructed or installed so that the south-facing glazing is fully shaded at solar noon on August 21 and ~~substantially~~ 80% exposed to direct sunlight at solar noon on December 21.

Shading in the Florida Building Code - Energy

The urgent demand to conserve energy and reduce cooling operations in warm climates has re-opened the centuries-old, common sense practice of controlling solar heat gain through the use of shading. In the past, only overhangs and projections were typical methods of providing such shading. However, today modern materials and innovative designs can provide functional, and high performing shading features that are architecturally pleasing.

Well-placed shading can result in energy savings by reducing direct solar gain through windows. Peak electricity demand is also reduced by shading resulting in lower peak demand charges from utilities and reduced mechanical equipment costs, thereby contributing to a more sustainable building. Shading has the ability to reduce glare in an interior space without the need to lower shades or close blinds, which results in maximum natural daylighting and less use of artificial lighting. Shading existing fenestration (clear single or double glazed) may be a viable and economical option when compared to replacement with highest performing soft-coat, low-E windows and doors with glass.

The state of Florida has recognized that usefulness of shading by including the concept in State Statute 553.9061 addressing scheduled increases in thermal efficiency standards. This statute has directed "the Florida Building Commission …to…identify within code support and compliance documentation the specific building options and elements available to meet the energy performance goals established in subsection (1). Energy efficiency performance options and elements include, but are not limited to:

(see ITEM J) Shading devices, sunscreening materials, and overhangs.

Link:
http://www.leg.state.fl.us/statutes/index.cfm?mode=View%20Statutes&SubMenu=1&App_mode=Display_Statute&Search_String=553.9061+++++++Scheduled+increases+in+thermal+efficiency+standards&URL=0500-0599/0553/Sections/0553.9061.html

Having recognized this requirement in the state statue, this proposal offers options to comply, including high performance windows.

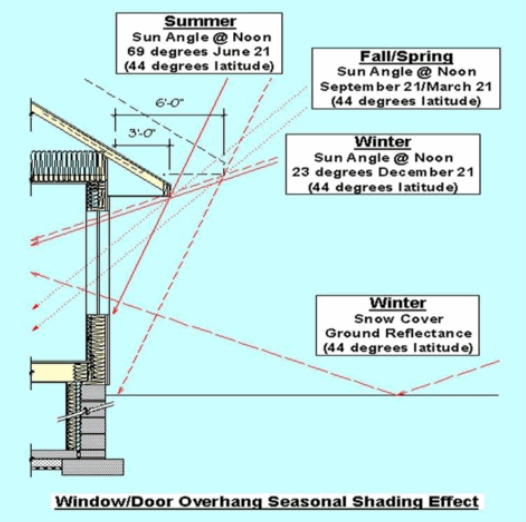
Regardless of the method used to for shading, many factors must be taken into consideration when using shading, such as:

- Geographic location (latitude and longitude)
- Building exposure to be shaded (south, east, or west)
- Time of year for complete or partial shading
- Critical time of day for shading
- The sun's position, azimuth, and altitude based on the location of the area to be shaded

Having definitions and multiple choices among the various broad shading options make the state statute enforceable.

The broad categories of permanent shading products are as follows:

Projections, such as overhangs, fins, eaves, and similar architectural features



Window/Door Overhang Seasonal Shading Effect

For projections to be effective, the projection must effectively shade the glazed opening. ASHRAE 90.1 provides calculation for a projection factor that offers the dimensions for proper shading from projections.

PF = A/B

PF = Projection factor (decimal).

A = Distance measured horizontally from the furthest continuous extremity of any overhang, eave, or permanently attached shading device to the vertical surface of the glazing.

B = Distance measured vertically from the bottom of the glazing to the underside of the overhang, eave, or permanently attached shading device.

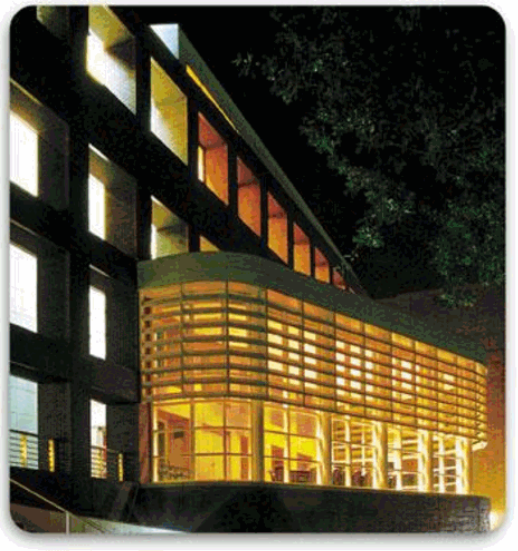
Projections

Sun Shades – cantilevered, horizontal line, and vertical line

Cantilevered. These sunshades are most effective on southern elevation during the midday hours when the sun is at its highest point in the sky. These systems are most often comprised of a series of slats or blades, available in many styles that provide a visually appealing application. The slats/blades allow for wind, and in some cases snow, to pass through. A suspended system distributes the load from the exterior sunshade to the building structure.

Cantilever Sunshade

Horizontal Line. Horizontal line sunshades are most effective when used on tall expanses of glass or on curtain walls where attaching a series of cantilevered sunshades on top of each other is not practical.



Horizontal Line Sunshade

Vertical Line. Vertical line sunshades are most effect on east and west elevations to block the low sun angles in the early morning and late afternoon. Typically, a hollow extruded shape sets either perpendicular to the building or at a slight rotation to maximize solar protection while providing occupants with the maximum amount of visibility to the outside.

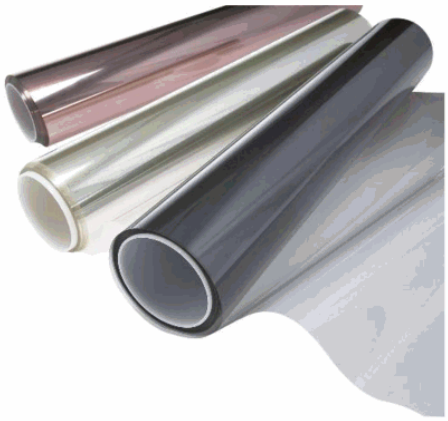
Vertical Line Sunshade

Window Film

Generally, window film provides specific personal and property protection from the effects of the sun as well as added safety and security in the events that result in broken glass. The efficiencies of solar control window films are closely related to local weather conditions, building orientation, window size, and other factors such as exterior shading conditions.

There are many types and constructions of solar control and safety window films. These films are considered in the building industry to be "retrofit" products; that is, products to be applied to existing buildings as opposed to use in new construction. In their simplest forms, window films are composed of a polyester substrate to which a scratch resistant coating is applied on one side; a mounting adhesive layer and a protective release liner is applied to the other side.

The effective life of window film will vary by the type of film, type of glass, window construction, compass orientation of glass, and in which part of the world the building is located. There are documented cases of film lasting 12 to 22 years or more in some instances.



Window Film

Louvers

Louvered sun screens provide shade and functional ventilation. Louvers can be designed with either vertical or horizontal blades and can be fixed or operational. Operational louvers can be designed to automatically move with the sun to reduce solar heat gain and glare, lower energy usage and maximize daylight. By effectively controlling the sun on all elevations, at all times of the day and throughout the year, controllable sunshades can significantly reduce the building's energy and capital equipment costs. These sunshades also prevent over or under shading so building occupants can always enjoy the benefits of natural daylight.

Operational Louvered Sunshade

Reason Statement for Modification 4327 – Shading Compliance Paths to Table 502.1.1.1

This modification recognizes the benefits provided by the permanent shading of fenestration in residential construction. The concept of shading has been in the 2000, 2003, 2006, and 2009 IECC for commercial buildings and has been proven to be very simple to calculate, fitting well into a prescriptive approach. This language has been derived from California's new mandatory Green Building Standards Code (CALGREEN), which encourages the use of all types of shading products and devices.

This modification allows for the use of permanent shading to meet the solar heat gain coefficient requirements of Table 502.1.1.1. Permanent exterior shading features, such as overhang and other projections, are allowed to be used in commercial construction as a prescriptive trade-off to meeting SHGC requirements within the code.

Allowing flexibility to meet the solar heat gain coefficient requirement through the use of proven shading alternatives will increase the usability of the code for the building and design community, while ensuring that the new fenestration is energy efficient. When credit for shading is permitted in the code, it encourages an integrated approach to building designs, energy use, construction materials, renewable resources, particularly as part of urban infrastructure, site and town planning and building design to be considered holistically. It also creates the opportunity for aesthetically pleasing and ingenious designs that might not otherwise be permitted. Shading in modern construction offers many possibilities, some yet to be fully explored.

Date Submitted	4/1/2010	**Section**	502.2.5	**Proponent**	Amanda Hickman
Chapter	5	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation No Affirmative Recommendation with a Second
Commission Action Pending Review

Related Modifications

Mod 4327 - Adds new section 502.2.5.1.3 for SHGC compliance paths in commercial

Summary of Modification

502.2.5.1 Shell buildings, renovations and alterations can comply with related modifcation new section 502.2.5.1.3.

Rationale

This modification is a companion modification to 4327. The same reason applies here.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

There is no fiscal impact to enforcement of the code.

Impact to building and property owners relative to cost of compliance with code

It can potentially decrease the cost of code compliance by offering multiple options to accomplish energy savings.

Impact to industry relative to the cost of compliance with code

There may be a slight increase in cost to industry in order to show SHGC equivalency with Table 402.1.1. Some of these costs may include: design guides, product specifications, marketing materials and advanced product development.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

The correct use of shading encourages natural daylighting (as opposed to decreasing the window to wall ration or dark glass) which has been shown to improve productivity and better sense of well being.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Yes, this modification encourages product options and flexibility

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

No, this modification encourages product options and flexibility.

Does not degrade the effectiveness of the code

This modification will increase the usability and effectiveness of the code for the building and design community, while ensuring that the new fenestration is energy efficient.

2nd Comment Period 09/03/2010 - 10/18/2010

Proponent Amanda Hickman **Submitted** 10/18/2010 **Attachments** Yes

EN4329-G7

Comment:

The Building Code Act of 2008 (HB 697) requires that energy efficiency performance goals be achieved through elements such as “shading devices, sunscreening materials, and overhangs.” This proposal is in line with that directive and we respectfully request that the TAC take a second look at the proposed language. Please see the attached rationale document.

1st Comment Period History 04/15/2010 - 06/01/2010

Proponent Brian Sernulka **Submitted** 6/1/2010 **Attachments** No

EN4329-G1

Comment:

BCAP believes that the Florida Building Code should be efficient, simple, and enforceable. Any trade-offs or exceptions to code requirements should be narrowly defined so that energy efficiency is improved (or at least maintained), and building officials should not be forced to make on-the-spot decisions about component efficiency. Modifications 4307, 4309, 4317, 4327, and 4329 all fail these basic principles, and should be rejected.

Modification 4329 extends the list of exceptions to fenestration SHGC requirements in modification 4327 to shell buildings, renovations and alterations. The modification suffers from the same compliance and enforcement problems as 4327, and those arguments will not be repeated here. In the context of renovations or alterations, it is not clear why this modification is necessary or why it would advance energy efficiency. Because we believe it would create enforcement problems, we recommend disapproval of modification 4329.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4329-G2

Proponent	Garrett Stone	Submitted	6/1/2010	Attachments	No

Comment:

Modification 4329 shares many of the same issues of Modification 4327, and we urge that it be rejected. The commercial chapter of the IECC and ASHRAE 90.1 both contain limited alternatives for designers who use projection factor for overhangs in combination with SHGC. There is no need to expand these alternatives to include the potentially limitless exceptions created by Modifications 4327 and 4329. These exceptions are particularly unwarranted in a replacement context. If the owner of an existing building determines that shading is appropriate or desirable, then overhangs, louvers, films, or other devices can simply be added to existing fenestration. However, if the building owner has determined that the entire window should be replaced, it does not make sense to promote the installation of inferior windows, then attempt to meet the SHGC requirement through one of the exceptions. Modification 4329 should be rejected.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4329-G3

Proponent	Thomas Larson	Submitted	6/1/2010	Attachments	No

Comment:

SACE's main interest in code revision is to advance energy efficiency as fast and as much as possible, respecting full life-cycle cost effectiveness. Fla. Energy Code should be aligned with IECC 2009 & successive revisions as closely as possible, and contribute to 20% energy improvement over 2007. We offer comment on this proposal:

• The Energy Code Workgroup carefully reviewed the IECC and the Florida Building Code and combined them in a manner that ensured a reasonable level of flexibility for builders, while reaching a 20% improvement in energy efficiency over the 2004 FBC.

• These proposals introduce a long list of alternative products that are not guaranteed to meet the same level of efficiency as the low-SHGC windows proposed in the code. The proposals also introduce a high level of ambiguity into the code and could create problems for code officials.

• Many of the products or devices listed as exceptions to the low-SHGC window requirement are either less durable than windows or can be easily removed by homeowners. There is no reason to allow trade-offs between SHGC, which is rated and labeled to a uniform standard, and products that may not be rated at all.

• It is much easier and more cost effective to install the correct glazing products in the first place. These proposals would create incentives to install windows that are not appropriate for Florida's climate.

• While well-designed shading can bring additional benefits to buildings, credit for shading is confined to computer-simulated compliance methods in which the precise impact can be measured.

• By contrast, the proposed set of alternatives allows shading (and a long list of other practices not typically allowed as trade-offs) to be directly traded off against SHGC.

• The benefits of low-SHGC windows are well settled. They result in lower energy bills, lower peak demand, and a lower environmental impact. These benefits should not be traded away for less certain benefits.

1st Comment Period History 04/15/2010 - 06/01/2010

EN4329-G4

Proponent	jeff inks	Submitted	6/1/2010	Attachments	No

Comment:

See comment submitted for EN4327

1st Comment Period History 04/15/2010 - 06/01/2010

EN4329-G5

Proponent	Eric Lacey	Submitted	6/1/2010	Attachments	No

Comment:

RECA recommends disapproval of Mod 4329 for the same reasons as Mod 4327. Mod 4329 should be disapproved because it would defeat the primary objectives for energy code modifications in this code cycle – specifically to improve the Florida code by: (1) tracking the nature, structure and provisions of the IECC, wherever possible; and (2) contributing to a 20% increase in energy efficiency compared to the 2004 Florida Building Code.

First, there are not similar provisions to those proposed in this mod in the IECC for commercial buildings -- the IECC commercial provision is carefully limited to permanent overhangs with specified projection factors and does not include the laundry list of less permanent and less certain shading approaches proposed here. Second, these provisions would not increase energy efficiency (since they are an exception to a requirement) and, due to compliance and other issues, are likely to substantially reduce energy efficiency.

• Calculation of what is "optimal" for overhangs will make code compliance and enforcement very difficult. The calculations required for shading and window films would make the prescriptive option confusing at best, and unenforceable at worst.

• It is not clear how a code official may determine whether the SHGC is "equivalent".

• It is also not clear how a code official is to calculate whether glazing is "fully shaded" at solar noon on August 21 and "substantially exposed to direct sunlight" on December 21.

These terms are not enforceable and will create liability issues for code officials and builders. Because window SHGC can be objectively determined and labeled, easily verified by building officials, and consistently installed by builders, there is no reason to create this loophole. Mod 4329 should be rejected.

1st Comment Period History 04/15/2010 - 06/01/2010

Proponent Harry Misuriello **Submitted** 6/1/2010 **Attachments** No

EN4329-G6

Comment:

Mod 4329 should not be approved. This is because it proposes SHGC exceptions and trade-offs that are not included in the IECC. Approval of this Mod would represent a departure from the objectives of this code development cycle which include alignment with the IECC structure and provisions. The IECC as published represents the predominant view of the nation's code officials concerning reasonable solar gain control that reduce energy usage and mitigate peak electrical demand in Florida's climate zones. The proposed Mod will also be much different than the comparable provisions in ASHRAE Standard 90.1. Both the IECC and ASHRAE approached are limited to permanent overhangs with well defined projection factors and represent a good public policy solution to offer design flexibility, yet achieve energy savings. The proposed Mod's energy savings are uncertain and undocumented. The proposed Mod also has compliance and enforceability issues in interpreting its complicated requirements. We urge the Task Group and Commission to disapprove this proposed Mod.

Revise text as follows:

502.2.5 Fenestration (Prescriptive).

502.2.5.1 Shell buildings, renovations and alterations. Fenestration shall comply with section 502.2.5.1.3 and Table 502.1.1.1.

Revise text as follows:

502.2.5 Fenestration (Prescriptive).

502.2.5.1 Shell buildings, renovations and alterations. Doors and skylights shall comply with Table 502.1.1.1. Other ~~F~~fenestration shall comply with section 502.2.5.1.3 and Table 502.1.1.1.

Shading in the Florida Building Code - Energy

The urgent demand to conserve energy and reduce cooling operations in warm climates has re-opened the centuries-old, common sense practice of controlling solar heat gain through the use of shading. In the past, only overhangs and projections were typical methods of providing such shading. However, today modern materials and innovative designs can provide functional, and high performing shading features that are architecturally pleasing.

Well-placed shading can result in energy savings by reducing direct solar gain through windows. Peak electricity demand is also reduced by shading resulting in lower peak demand charges from utilities and reduced mechanical equipment costs, thereby contributing to a more sustainable building. Shading has the ability to reduce glare in an interior space without the need to lower shades or close blinds, which results in maximum natural daylighting and less use of artificial lighting. Shading existing fenestration (clear single or double glazed) may be a viable and economical option when compared to replacement with highest performing soft-coat, low-E windows and doors with glass.

The state of Florida has recognized that usefulness of shading by including the concept in State Statute 553.9061 addressing scheduled increases in thermal efficiency standards. This statute has directed "the Florida Building Commission …to…identify within code support and compliance documentation the specific building options and elements available to meet the energy performance goals established in subsection (1). Energy efficiency performance options and elements include, but are not limited to:

(see ITEM J) Shading devices, sunscreening materials, and overhangs.

Link:
http://www.leg.state.fl.us/statutes/index.cfm?mode=View%20Statutes&SubMenu=1&App_mode=Display_Statute&Search_String=553.9061+++++++Scheduled+increases+in+thermal+efficiency+standards&URL=0500-0599/0553/Sections/0553.9061.html

Having recognized this requirement in the state statue, this proposal offers options to comply, including high performance windows.

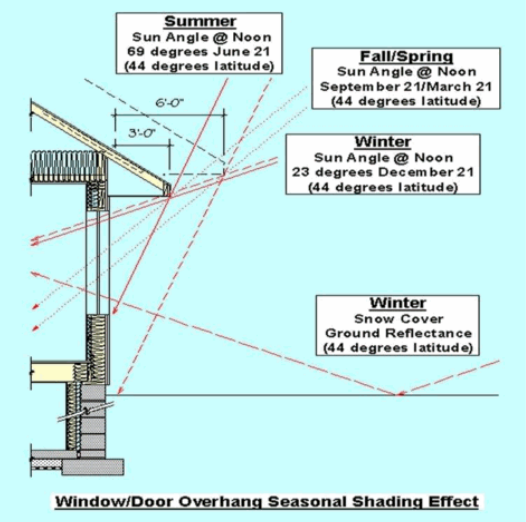
Regardless of the method used to for shading, many factors must be taken into consideration when using shading, such as:

- Geographic location (latitude and longitude)
- Building exposure to be shaded (south, east, or west)
- Time of year for complete or partial shading
- Critical time of day for shading
- The sun's position, azimuth, and altitude based on the location of the area to be shaded

Having definitions and multiple choices among the various broad shading options make the state statute enforceable.

The broad categories of permanent shading products are as follows:

Projections, such as overhangs, fins, eaves, and similar architectural features



Window/Door Overhang Seasonal Shading Effect

For projections to be effective, the projection must effectively shade the glazed opening. ASHRAE 90.1 provides calculation for a projection factor that offers the dimensions for proper shading from projections.

PF = A/B

PF = Projection factor (decimal).

A = Distance measured horizontally from the furthest continuous extremity of any overhang, eave, or permanently attached shading device to the vertical surface of the glazing.

B = Distance measured vertically from the bottom of the glazing to the underside of the overhang, eave, or permanently attached shading device.

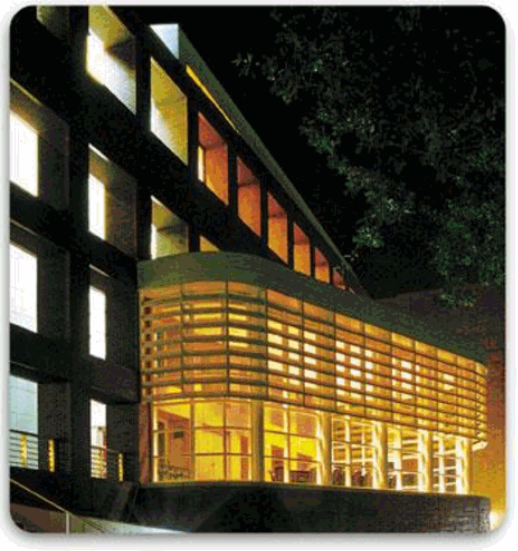
Projections

Sun Shades – cantilevered, horizontal line, and vertical line

Cantilevered. These sunshades are most effective on southern elevation during the midday hours when the sun is at its highest point in the sky. These systems are most often comprised of a series of slats or blades, available in many styles that provide a visually appealing application. The slats/blades allow for wind, and in some cases snow, to pass through. A suspended system distributes the load from the exterior sunshade to the building structure.

Cantilever Sunshade

Horizontal Line. Horizontal line sunshades are most effective when used on tall expanses of glass or on curtain walls where attaching a series of cantilevered sunshades on top of each other is not practical.



Horizontal Line Sunshade

Vertical Line. Vertical line sunshades are most effect on east and west elevations to block the low sun angles in the early morning and late afternoon. Typically, a hollow extruded shape sets either perpendicular to the building or at a slight rotation to maximize solar protection while providing occupants with the maximum amount of visibility to the outside.

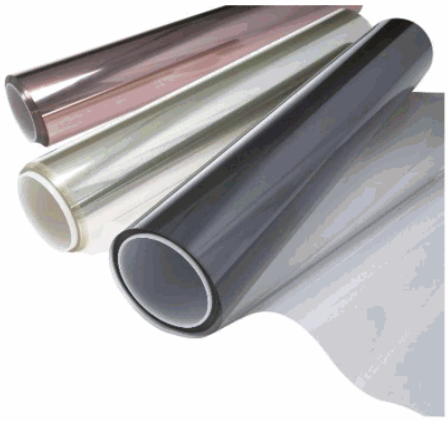
Vertical Line Sunshade

Window Film

Generally, window film provides specific personal and property protection from the effects of the sun as well as added safety and security in the events that result in broken glass. The efficiencies of solar control window films are closely related to local weather conditions, building orientation, window size, and other factors such as exterior shading conditions.

There are many types and constructions of solar control and safety window films. These films are considered in the building industry to be "retrofit" products; that is, products to be applied to existing buildings as opposed to use in new construction. In their simplest forms, window films are composed of a polyester substrate to which a scratch resistant coating is applied on one side; a mounting adhesive layer and a protective release liner is applied to the other side.

The effective life of window film will vary by the type of film, type of glass, window construction, compass orientation of glass, and in which part of the world the building is located. There are documented cases of film lasting 12 to 22 years or more in some instances.



Window Film

Louvers

Louvered sun screens provide shade and functional ventilation. Louvers can be designed with either vertical or horizontal blades and can be fixed or operational. Operational louvers can be designed to automatically move with the sun to reduce solar heat gain and glare, lower energy usage and maximize daylight. By effectively controlling the sun on all elevations, at all times of the day and throughout the year, controllable sunshades can significantly reduce the building's energy and capital equipment costs. These sunshades also prevent over or under shading so building occupants can always enjoy the benefits of natural daylight.

Operational Louvered Sunshade

Reason Statement for Modification 4327 – Shading Compliance Paths to Table 502.1.1.1

This modification recognizes the benefits provided by the permanent shading of fenestration in residential construction. The concept of shading has been in the 2000, 2003, 2006, and 2009 IECC for commercial buildings and has been proven to be very simple to calculate, fitting well into a prescriptive approach. This language has been derived from California's new mandatory Green Building Standards Code (CALGREEN), which encourages the use of all types of shading products and devices.

This modification allows for the use of permanent shading to meet the solar heat gain coefficient requirements of Table 502.1.1.1. Permanent exterior shading features, such as overhang and other projections, are allowed to be used in commercial construction as a prescriptive trade-off to meeting SHGC requirements within the code.

Allowing flexibility to meet the solar heat gain coefficient requirement through the use of proven shading alternatives will increase the usability of the code for the building and design community, while ensuring that the new fenestration is energy efficient. When credit for shading is permitted in the code, it encourages an integrated approach to building designs, energy use, construction materials, renewable resources, particularly as part of urban infrastructure, site and town planning and building design to be considered holistically. It also creates the opportunity for aesthetically pleasing and ingenious designs that might not otherwise be permitted. Shading in modern construction offers many possibilities, some yet to be fully explored.

Date Submitted	4/1/2010	**Section**	503.2.6	**Proponent**	Amanda Hickman
Chapter	5	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation No Affirmative Recommendation with a Second

Commission Action Pending Review

Related Modifications

NA

Summary of Modification

Change outside air supply from 70% to 30%

Rationale

see attached

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

The ERVs are attached to the HVAC unit or built in to the unit and are very easy to verify that the ERV is part of the unit as they are almost the same size as the HVAC unit.

Impact to building and property owners relative to cost of compliance with code

The ERVs have a pay back in energy savings in less than one year and will continue to save energy as shown on the energy analysis in the rational statement of this modification.

Impact to industry relative to the cost of compliance with code

The use of ERVs to recycle 70 to 80% of the total energy contained in the exhaust air reduces the size of the HVAC unit and the cost of the ERV is offset by the reduction of cost of the HVAC equipment but the cost of the overall equipment is increased.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

The health of the general public has been directly linked to supplying the correct amount of ventilation air to the building. ERVs have fans to supply the correct amount of ventilation air and therefore do a better job of furnishing the correct amount of ventilation air than a unit without an ERV.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

ERVs have been in use for over 20 years; with today energy cost it is important to use all of the tools available to save energy. ERVs lower energy cost, improve the ventilation air amount that is supplied to the building and helps control the humidity to improve the health of the occupants.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

The ERVs are available from several sources and do not discriminate against any system that we know about.

Does not degrade the effectiveness of the code

ERVs will not degrade the effectiveness of the code and with the push to save energy this proposal is in line with the guide lines established to reduce energy consumption of buildings.

2nd Comment Period 09/03/2010 - 10/18/2010

Proponent Amanda Hickman **Submitted** 10/18/2010 **Attachments** No

EN4042-G1

Comment:

A standard used by ARI companies was used to generate the energy cost savings when using ERV's. Based upon the cost analyses given – Changing the outside air supply from 70% to 30% is both cost effective and saves energy. We respectfully request that the TAC take a second look at the proposed language.

503.2.6 Exhaust air energy recovery for cooling systems. Individual cooling fan systems that have both a design supply air capacity of 5,000 cfm (2.36 m3/s) or greater and a minimum outside air supply of ~~70~~ 30 percent or greater of the design supply air quantity shall have an energy recovery system that provides a change in the enthalpy of the outdoor air supply of 50 percent or more of the difference between the outdoor air and return air at design conditions.

Reason Statement for Exhaust air energy recovery for cooling systems – Mod 4042

The reason to lower the outside air requirements for exhaust air energy recovery systems down to 30% from the 70% that the code now requires is as follows:

Outside air can represent up to 50% of the of the total HVAC building load. An energy recovery wheel recycles energy from the exhausted building air to pre-condition incoming ventilation air. By recycling 70 - 80% of the total energy contained in the exhaust air, recovery wheels lower total HVAC energy usage.

Energy recovery wheels offer a highly efficient alternative to condition the outdoor air as compared to a typical roof top DX system. Combining the two technologies can increase the total system efficiency up to 40%

At the present, the code requires a minimum of 70% outside air before an ERV is required. That represents less than 5% of the HVAC units being installed. By changing the requirement to 30%, a large percentage of new installations will be required to install ERVs and the energy savings will be amplified.

The attached energy analysis of a three cities unit with 30% outside air shows an energy cost savings of at least $1354 per year and the installed cost being $3790 less with the ERV unit due to reducing the size of the HVAC system.

Date Submitted	3/23/2010	**Section**	503.2.7.1.1	**Proponent**	Darrell Winters
Chapter	5	**Affects HVHZ**	No	**Attachments**	No

TAC Recommendation No Affirmative Recommendation with a Second

Commission Action Pending Review

Related Modifications

Summary of Modification

Eliminates the reduced insulation levels being introduced into the code.

Rationale

Eliminates reduced duct insulation levels being introduced into the code.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

No impact on code enforcement.

Impact to building and property owners relative to cost of compliance with code

Any cost impact will be offset by energy savings.

Impact to industry relative to the cost of compliance with code

No impact to industry.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Does not affect health, safety and welfare.

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Strengthens the code by saving energy.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

No discrimination against any material, product, method or system.

Does not degrade the effectiveness of the code

Improves the code.

2nd Comment Period 09/03/2010 - 10/18/2010

EN3717-G1

Proponent Arlene Stewart **Submitted** 10/18/2010 **Attachments** No

Comment:

TAC Action should be overturned as this proposed language is current I-Code language.

503.2.7.1.1 Insulation required. All supply and return air ducts and plenums shall be insulated ~~to the levels shown in Table 503.2.7.1~~ with a minimum of R-5 insulation when located in unconditioned spaces and a minimum of R-8 insulation when located outside the building. When located within a building envelope assembly, the duct or plenum shall be separated from the building exterior or unconditioned or exempt spaces by a minimum of R-8 insulation.

Exceptions:

1. When located within equipment.

2. When the design temperature difference between the interior and exterior of the duct or plenum does not exceed 15°F (8°C).

~~3.For runouts less than 10 feet (3048 mm) in length to air terminals or air outlets, the rated R-value of insulation need not exceed R-5.~~

~~4.Backs of air outlets and outlet plenums exposed to unconditioned or indirectly conditioned spaces with face areas exceeding 5 square feet (.46 m^2) need not exceed R-2; those 5 square feet (.46 m^2) or smaller need not be insulated.~~

~~5.Return air ducts meeting all the requirements for building cavities which will be used as return air plenums.~~

Date Submitted	4/1/2010	**Section**	506.3	**Proponent**	Mangesh Basarkar
Chapter	5	**Affects HVHZ**	No	**Attachments**	Yes

TAC Recommendation No Affirmative Recommendation with a Second

Commission Action Pending Review

Related Modifications

Summary of Modification

Addition of credit for use of Energy Ventilation (ERV) Systems in performance method

Rationale

Current code software does not account for ERV systems. Studies conducted at FSEC for 7 typical building types (large and small offices, retail stores, schools, fast food restaurants, hotels & portable classrooms) show some HVAC energy savings potential using ERV systems for different climate zones in Florida. Results from the office building studies were used to determine the suggested credit.

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

No impact to local entities relative to enforcement of code is envisioned

Impact to building and property owners relative to cost of compliance with code

No impact to building and property owners relative to cost of compliance with code is envisioned

Impact to industry relative to the cost of compliance with code

No impact to industry relative to cost of code compliance is envisioned

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Proposal has no connection with health, safety and welfare of the general public

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Proposal improves the code by encouraging industry to adopt progressive energy saving techniques like ERV systems

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

Proposed code modification does not discriminate again any materials, products, methods or systems of construction

Does not degrade the effectiveness of the code

Proposed code modification does not degrade the effectiveness of the code

Alternate Language

2nd Comment Period 09/03/2010 - 10/18/2010

EN4293-A1

Proponent Mangesh Basarkar **Submitted** 10/6/2010 **Attachments** Yes

Rationale

Intent is to specify that humidity control (moisture exchange) is the target technology of this modification. Enthalpy exchange technologies and devices that remove moisture from the outside air being introduced for ventilation purposes into the building, are finding increased usage in commercial buildings today and stake holders would like to take credit for energy saving devices like Enthalpy Recovery Ventilators. This credit is being proposed as the current code software does not account f

Fiscal Impact Statement

Impact to local entity relative to enforcement of code

Minimal. Need only to verify existence of device and associated efficiencies.

Impact to building and property owners relative to cost of compliance with code

None. Such devices are already being used within buildings today.

Impact to industry relative to the cost of compliance with code

None. Such devices are already being produced within the industry today.

Requirements

Has a reasonable and substantial connection with the health, safety, and welfare of the general public

Does not impact the health, safety and welfare of the general public

Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction

Yes, improves the code by encouraging stake holders to use energy efficient technologies like ERV's. Allows existing ERV users to take advantage of their investment.

Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

This modification does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities

Does not degrade the effectiveness of the code

This modification does not degrade the effectiveness of the code

Proposal:

The following credit is being proposed for buildings using Energy Recovery Ventilation (ERV) systems.

506.3.3 Requirements specific to credit options. Credit may be claimed in the compliance calculation for technologies that meet the criteria for various options specified below.

506.3.3.1 Vegetative Roofs. (separate code modification proposal is being submitted)

506.3.3.2 Energy Recovery Ventilation Systems. Credit may be claimed in the whole building performance method calculations for Energy Recovery Ventilation systems used in the proposed building. This credit is applicable for buildings in which every HVAC system has a design supply air flow of less than 5000 CFM.The credit shall also applicable to buildings where one or more HVAC system in the building has a design supply flow equal to 5000 CFM or greater but shall have minimum outdoor air supply to be less than 70% of the design supply air flow for that HVAC system.

The credit shall provide for a reduction of 6% of total HVAC annual energy use for buildings located in climate zone 1 and 4% of total HVAC annual energy use for buildings located in climate zone 2.

Addition of credit for use of ~~Energy~~ Enthalpy Recovery Ventilation (ERV) Systems in performance method

506.3.3 Requirements specific to credit options. Credit may be claimed in the compliance calculation for technologies that meet the criteria for various options specified below.

506.3.3.1 Vegetative Roofs. (separate code modification proposal is being submitted)

506.3.3.2 ~~Energy~~ Enthalpy Recovery Ventilation Systems. Credit may be claimed in the whole building performance method calculations for ~~Energy~~ Enthalpy Recovery Ventilation systems used in the proposed building. This credit is applicable for buildings in which every HVAC system has a design supply air flow of less than 5000 CFM.The credit shall also applicable to buildings where one or more HVAC system in the building has a design supply flow equal to 5000 CFM or greater but shall have minimum outdoor air supply to be less than 70% of the design supply air flow for that HVAC system.

The credit shall provide for a reduction of 6% of total HVAC annual energy use for buildings located in climate zone 1 and 4% of total HVAC annual energy use for buildings located in climate zone 2.