**Energy Technical Advisory Committee (TAC)/Electrical TAC – Comments**

**7th Edition (2020) Florida Building Code, Energy Conservation- Residential**

**CHAPTER 4 [RE] RESIDENTIAL ENERGY EFFICIENCY**

EN-ER-Ch. 4- Comment #1

From: Jeff Sonne [mailto:jeff@fsec.ucf.edu]
Sent: Friday, December 20, 2019 4:30 PM
To: Madani, Mo
Cc: 'Robin Vieira'
Subject: Comments for February Workshop

Mo,

FSEC would like to request that the attached comments be considered during the February rule development workshop.

Please let us know if you need anything further here.

Thank you,

Jeff

**1) Revisit mod 7597:** alt language mod A3 referencing ANSI/RESNET/ICC 301 Addendum A-2015 was approved; we would like to have alt language A4 reconsidered.  A4 makes the same service water heating calculation change as A3 but would:

- Change the chapter 6 [RE] reference listing for ANSI/RESNET/ICC 301 from the 2014 to 2019 version
- Since Addendum A-2015 is included in ANSI/RESNET/ICC 301-2019, remove "Addendum A-2015" language a) from the service water heating section of Table R405.5.2(1), b) from Section R406.4, and c) from chapter 6 [RE].

**2) Reference** ANSI/RESNET/ICC 301-2019 **Addendum A-2019** in chapter 6 [RE] and in ERI Section R406.4 as follows:

**R406.4 ERI-based compliance.**

The ERI for the *rated design* shall be determined in accordance with ANSI/RESNET/ICC 301, including Addendum A-201~~5~~9, and be shown to have an ERI less than or equal to the appropriate value listed in Table R406.4.

[No other changes to section.]

**Rationale for both changes:** ANSI/RESNET/ICC 301-2019 brings Florida code up to the latest standard, and also allows Addendum A-2019 to be referenced. Addendum A-2019 better defines current appliance characteristics which will allow currently used appliance label data to be entered into code software without requiring conversion, and will also help reduce ERI calculation discrepancies among code software vendors.

Appendix RD - **FORMS** –

EN-RE-RD- Comment #1

From: Jeff Sonne [mailto:jeff@fsec.ucf.edu]
Sent: Thursday, October 3, 2019 5:25 PM
To: Madani, Mo
Subject: Mod 7677 Minor Edits

Hi Mo,

I've attached mod 7677 with a few minor edits that we'd appreciate having considered during one of the remaining code change workshops.

For the fourth line of the test data entry section, we've added the word "others", so it now reads "Sum of any others."  We also removed an extra space in the word "Results" near the top of the report and made a few slight text realignments to improve appearance.  No other changes to the version previously approved by the Commission.

Please let me know if you need anything further.

Thank you,

Jeff

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Jeff Sonne

Senior Research Engineer

Buildings Research Division

Florida Solar Energy Center

A Research Institute of the University of Central Florida

1679 Clearlake Road

Cocoa, FL 32922

321-638-1406

**Duct Leakage Test Report**



|  |  |
| --- | --- |
| System 1 |  cfm25 |
| System 2 |  cfm25 |
| System 3 |  cfm25 |
| Sum of anyothers |  cfm25 |
| Total of all |  cfm25 |

Residential Prescriptive, Performance or ERI Method Compliance 2020 Florida Building Code, Energy Conservation, 7th Edition

|  |  |  |  |
| --- | --- | --- | --- |
|  | Jurisdiction: | Permit | #: |
| **Job Information** |
| Builder: | Community: | Lot: |
| Address: |
| City: | State: FL | Zip: |
| **Duct Leakage Test Results** |  **Prescriptive Method** |  **Performance/ERI Method** |
| **Prescriptive Method** cfm25 (Total)To qualify as "substantially leak free" Qn Total must be less than or equal to 0.04 if air handler unit is installed. If air handler unit is not installed, Qn Total must be less than or equal to 0.03. This testing method meets the requirements in accordance with Section R403.3.3.*Is the air handler unit installed during testing?* YES ( = .04) NO ( = .03)Qn Qn **Performance/ERI Method** cfm25 (Out or Total)To qualify using this method, Qn must not be greater than the proposed ÷ = Qn duct leakage Qn specified on Form R405-2020 or R406-2020.Total of all Total Conditionedsystems Square Footage *Leakage Type selected on Form Qn specified on Form R405-2020**R405-2020 (EnergyCalc) or R406-2020 (EnergyCalc) or R406-2020***PASS FAIL**Duct tightness shall be verified by testing in accordance with ANSI/RESNET/ICC380 by either individuals as defined in Section 553.993(5) or (7), Florida Statutes, or individuals licensed as set forth in Section 489.105(3)(f), (g) or (i), Florida Statutes. |
|  | Testing Company |
| Company Name: Phone: I hereby verify that the above duct leakage testing results are in accordance with the Florida Building Code requirements with the selected compliance path as stated above, either the Prescriptive Method or Performance Method.Signature of Tester: Date of Test: Printed Name of Tester: License/Certification #: Issuing Authority:  |

Page 1 of 1

**TAC Recommendation:**

**Commission Action:**

**6th Edition (2017) Florida Building Code, Energy Conservation- Commercial**

**Chapter 4 [CE] COMMERCIAL ENERGY EFFICIENCY**

EN-CE-Ch.4- Comment #1

**From:** Leo Smith [mailto:leo@smith.net]
**Sent:** Thursday, December 12, 2019 1:36 PM
**To:** Madani, Mo
**Subject:** Amendment to Commercial Energy Code

Regarding Code Development:

I would respectfully like to submit the attached proposed code change to Florida’s Commercial Energy Code

to require exterior lighting fixtures that emit 2600 lumens or more to be full cutoff (fully shielded), under the premise that

all exterior light that is misdirected away from the target (into the sky or onto neighboring

property) represents wasted energy. Shielding requirements have no additional cost on the end user.

Please advise if I may submit a formal proposed code change, and whether a specific submission form is needed.

Leo Smith
1060 Mapleton Avenue
Suffield, CT 06078
860-668-4000

(See attachment 1)

**TAC Recommendation:**

**Commission Action:**

Bryan P. Holland, MCP, AStd.

Southern Region Field Representative

EN/E-CE-Ch.4- Comment #2

**Revise Section C401.2**

**C401.2 Application.** Commercial buildings shall comply with one of the following:

1. The requirements of ANSI/ASHRAE/IESNA 90.1, excluding section 9.4.1.1(g) ~~and section 8.4.2~~ of the standard.
2. The requirements of Sections C402 through C405 and Section C408. In addition, commercial buildings shall comply with SectionC406and tenant spaces shall comply withSectionC406.1.1.
3. 3. The requirements of Sections C402.5, C403.2, C404, C405.2, C405.3, C405.5, C405.6, C407, and C407 Section C408. The building energy cost shall be equal to or less than 85 percent of the standard reference design building.

**REASON FOR COMMENT AND RECOMMENDED CHANGES:**

* The proponent of the modification to add this exemption provided no data, factual evidence, case studies, or anything other than anecdotal statements on cost, effectiveness, and safety. All of these statements were shown to be false or misleading in the written comments submitted and the opposition testimony provided (six independent case studies provided).
* Automatic Receptacle Control has been included in the ASHRAE 90.1 Standard since 2010 with zero reports of fire, shock, injury, or damage to any person or any building. This includes the state of Florida where automatic receptacle control has been mandatory since 2016 (DEC 2016-033).
* Automatic Receptacle Control has been added to the 2021 IECC-C as a mandatory requirement in a new C405.10. The electrical industry and national consensus standards are moving in the complete opposite direction to this change.

**TAC Recommendation:**

**Commission Action:**

EN-CE-Ch.4- Comment #3

Bryan P. Holland, MCP, AStd.

Southern Region Field Representative

**Add Section C403.4.2.4**

**C403.4.2.4 Part-load controls.** Hydronic systems greater than or equal to ~~500,000 Btu/h (146.5 kW)~~ 300,000 Btu/h (87.9 kW) in design output capacity supplying heated or chilled water to comfort conditioning systems shall include controls that ~~have the capability~~ are configured to do all of the following:

1. Automatically reset the supply-water temperatures in response to varying building heating and cooling demand using coil valve position, zone return water temperature, building-return water temperature or outside air temperature. The temperature shall be capable of being reset by not less than 25 percent of the design supply-to-return water temperature difference.

2. Automatically vary fluid flow for hydronic systems with a combined motor capacity of ~~10 hp (7.5 kW)~~ 2 hp (1.5 kW) or larger with three or more control valves or other devices by reducing the system design flow rate by not less than 50 percent or the maximum reduction allowed by the equipment manufacturer for proper operation of equipment by ~~designed~~ valves that modulate or step open and close, or pumps that modulate or turn on and off as a function of load.

3. Automatically vary pump flow on heating-water systems, chilled-water systems and heat rejection loops serving water-cooled unitary air conditioners as follows: ~~with a combined motor capacity of 10 hp (7.5 kW) or larger by reducing pump design flow by not less than 50 percent, utilizing adjustable speed drives on pumps, or multiple-staged pumps where not less than one-half of the total pump horsepower is capable of being automatically turned off. Pump flow shall be controlled to maintain one control valve nearly wide open or to satisfy the minimum differential pressure.~~

3.1 Where pumps operate continuously or operate based on a time schedule, pumps with nominal output motor power of 2 hp or more shall have a variable speed drive.

3.2. Where pumps have automatic direct digital control configured to operate pumps only when zone heating or cooling is required, a variable speed drive shall be provided for pumps with motors having the same or greater nominal output power indicated in Table C403.4.4 based on the climate zone and system served.

4. Where a variable speed drive is required by Item 3 of this Section, pump motor power input shall be not more than 30 percent of design wattage at 50 percent of the design water flow. Pump flow shall be controlled to maintain one control valve nearly wide open or to satisfy the minimum differential pressure.

**Exceptions:**

1. Supply-water temperature reset is not required for chilled-water systems supplied by off-site district chilled water or chilled water from ice storage systems.

2. ~~Minimum flow rates other than 50 percent as required by the equipment manufacturer for proper operation of equipment where using flow bypass or end-of-line 3-way valves~~ Variable pump flow is not required on dedicated coil circulation pumps where needed for freeze protection.

3. Variable pump flow is not required on dedicated equipment circulation pumps where configured in primary/secondary design to provide the minimum flow requirements of the equipment manufacturer for proper operation of equipment.

4. Variable speed drives are not required on heating water pumps where more than 50 percent of annual heat is generated by an electric boiler.

**REASON FOR COMMENT AND RECOMMENDED CHANGES:**

* The 200,000 Btu/h capacity and 8-hp rating reduction was supported by industry based on a PNNL study that showed significant cost savings and rapid ROI. An analysis of energy impact shows that annual savings from expanding the use of motor speed control in the proposal ranges from $1,303 to $401 for 10 to 3 horsepower heating pumps and from $1821 to $386 for 10 to 2 horsepower cooling pumps in typical HVAC systems. There has been no industry opposition these changes in the 2018 IECC-C and ASHRAE 90.1 Standard.
* Variable flow systems use less pumping energy than constant flow systems. Variable pumping systems also produce larger system temperature differences that can enhance chiller efficiency and condensing boiler efficiency. Variable flow systems can reduce flow either by throttling flow and then having the pump "ride the pump curve" to reduce flow and energy at higher pressure or by using a VSD. Using a variable speed drive provides similar flow control at a lower energy cost, as pressure differential is reduced.

**TAC Recommendation:**

**Commission Action:**

EN/E-CE-Ch.4- Comment #4

Bryan P. Holland, MCP, AStd.

Southern Region Field Representative

**Revise Section C405.6.1**

**C405.6 Electrical power (Mandatory).**

**C405.6.1 Applicability.**

This section applies to all building power distribution systems. The provisions for electrical distribution for all sections of this code are subject to ~~the design conditions~~ the requirements of Section 8 Power in ASHRAE Standard 90.1.

**REASON FOR COMMENT AND RECOMMENDED CHANGES:**

* The current language is vague, confusing, and not well understood in the field. The revised language adds a pointer to the specific requirements in the ASHRAE standard that are applicable as clearly indicated in Declaratory Statement DS2016-033.
* The Electrical TAC recommended this modification for approval unanimously 9-0. The electrical industry is the most impacted by the rule and with this vote has shown the need for the code change.

**TAC/EN Recommendation:**

**TAC/E Recommendation:**

**Commission Action:**

EN/E-CE-Ch.4- Comment #5

Bryan P. Holland, MCP, AStd.

Southern Region Field Representative

**Revise Section C405.6.3 and Add Definition to C202**

**C405.6.3 Voltage drop.** ~~The conductors for feeders and branch circuits combined shall be sized for a maximum of 5 percent voltage drop total.~~ The total voltage drop across the combination of customer-owned service conductors, feeder conductors, and branch circuit conductors shall not exceed 5 percent.

**C202 Definition.**

VOLTAGE DROP. A decrease in voltage caused by losses in the wiring systems that connect the power source to the load.

**REASON FOR COMMENT AND RECOMMENDED CHANGES:**

* The revised language simply adds "customer-owned service conductors" to the voltage drop requirement as previously required in earlier editions of the FBC Energy Conservation Code.
* Excluding these premises wiring conductors from the calculation can results in excess energy losses on the system before a single load is being supplied.
* Please be advised the ICC Commercial Energy Code Development Committee unanimously voted 15-0 to approve Proposal CE214-19 during the ICC Group B Committee Action Hearings and was added to the consent agenda for approval at the Public Comment Hearings. This will keep the Florida Energy Code aligned with the IECC-C.

**TAC/EN Recommendation:**

**TAC/E Recommendation:**

**Commission Action:**

EN/E-CE-Ch.4- Comment #6

Bryan P. Holland, MCP, AStd.

Southern Region Field Representative

**Add Section C450.10 and Add Definitions to C202**

**C202 Definitions.**

**ELECTRIC VEHICLE (EV).** An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, electric motorcycles, and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery, fuel cell, photovoltaic array, or other source of electric current. Plug-in hybrid electric vehicles (PHEV) are electric vehicles having a second source of motive power. Off-road, self-propelled electric mobile equipment, such as industrial trucks, hoists, lifts, transports, golf carts, airline ground support equipment, tractors, boats, and the like are not considered electric vehicles.

**ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE).** The conductors, including the ungrounded, grounded, and equipment grounding conductors, and the *Electric Vehicle* connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the *Electric Vehicle*.

**EV CAPABLE SPACE.** Electrical panel capacity and space to support a minimum 50-ampere, 208/240-volt branch circuit for each EV parking space, and the installation of raceways, both underground and surface mounted, to support the *EVSE*.

**EV READY SPACE.**A designated parking space which is provided with one 50-ampere, 208/240-volt dedicated branch circuit for a future dedicated Level 2 *EVSE* servicing *Electric Vehicles*. The circuit shall terminate in a NEMA 6-50 or NEMA 14-50 receptacle or a suitable electrical connector rated for 208/240 or greater service. The circuit shall have no other outlets. The service panel shall include an over-current protective device and provide sufficient capacity and space to accommodate the circuit and over-current protective device and be located in close proximity to the proposed location of the EV parking spaces.

**C405.10. *Electric Vehicle (EV)* charging for new construction (Mandatory).** New construction shall facilitate future installation and use of *Electric Vehicle Supply Equipment (EVSE)* in accordance with the NFPA 70.

**C405.10.1. New buildings.** *EV Ready Spaces* and *EV Capable Spaces* shall be provided in accordance with Table C405.10.1. Where the calculation of percent served results in a fractional parking space, it shall be shall rounded up to the next whole number. The service panel or sub panel circuit directory shall identify the spaces reserved to support EV charging as “EV Capable” or “EV Ready”. The raceway location shall be permanently and visibly marked as “EV Capable”.



**C405.10.2. Identification.** Construction documents shall indicate the raceway termination point and proposed location of future EV spaces and *EVSE*. Construction documents shall also provide information on amperage of future *EVSE*, raceway methods, wiring schematics and electrical load calculations to verify that the electrical panel service capacity and electrical system, including any on-site distribution transformers, have sufficient capacity to simultaneously charge all EVs at all required EV spaces at the full rated amperage of the EVSE.

**REASON FOR COMMENT AND RECOMMENDED CHANGES:**

* New buildings are constructed to last for decades making it critical that EV charging infrastructure is incorporated at the pre-construction stage to ensure that new buildings can accommodate the charging needs of future EV-owners.
* The costs associated with retrofitting parking lots and garages far exceeds the costs associated with installation at time of original construction.
* This exact language will be included in the 2021 IECC-C with the approval of CE217-19, Part II.

**TAC/EN Recommendation:**

**TAC/E Recommendation:**

**Commission Action:**

EN/E-CE-Ch.4- Comment #7

Bryan P. Holland, MCP, AStd.

Southern Region Field Representative

**Add Section 405.10**

**C405.10 Energy Monitoring (Mandatory).** New buildings with a gross conditioned floor area of 25,000 square feet or larger shall be equipped to measure, monitor, record and report energy consumption data in compliance with Section C405.10.1 through C405.10.5.

Exception: R-2 occupancies and Individual tenant spaces are not required to comply with this section provided the space has its own utility services and meters and has less than 5,000 square feet of conditioned floor area.

**C405.10.1 Electrical energy metering.** For electrical energy, including all electrical energy supplied to the building and its associated site, including but not limited to site lighting, parking, recreational facilities, and other areas that serve the building and its occupants, meters or other measurement devices shall be provided to collect energy consumption data for each end-use category required by Section C405.10.2.

**C405.10.2 End-use metering categories.** Meters or other approved measurement devices shall be provided to collect energy use data for each end-use category indicated in Table 405.10.2. Where multiple meters are used to measure any end-use category, the data acquisition system shall total all of the energy used by that category. Not more than 5 percent of the measured load for each of the end-use categories indicated in Table 405.10.2 shall be permitted to be from a load that is not within that category.

**Exceptions:**

1.HVAC and water heating equipment serving only an individual dwelling unit shall not require end-use metering.

2.End-use metering shall not be required for fire pumps, stairwell pressurization fans or any system that operates only during testing or emergency.

3.End-use metering shall not be required for an individual tenant space having a floor area not greater than 2,500 square feet where a dedicated source meter complying with Section C405.10.3 is provided.



**C405.10.3 Meters.** Meters or other measurement devices required by this section shall be configured to automatically communicate energy consumption data to the data acquisition system required by Section C405.10.4. Source meters shall be allowed to be any digital-type meter. Lighting, HVAC, or other building systems that can monitor their energy consumption shall be permitted instead of meters. Current sensors shall be permitted, provided that they have a tested accuracy of plus or minus 2 percent. Required metering systems and equipment shall have the capability to provide at least hourly data that is fully integrated into the data acquisition system and graphical energy report in accordance with Sections C405.10.4 and C405.10.5.

**C405.10.4 Data acquisition system**. A data acquisition system shall have the capability to store the data from the required meters and other sensing devices for minimum of 36 months. The data acquisition system shall have the capability to store real-time energy consumption data and provide hourly, daily, monthly, and yearly logged data for each end-use category required by Section C405.10.2.

**C405.10.5 Graphical energy report.** A permanent and readily accessible reporting mechanism shall be provided in the building that is accessible by building operation and management personnel. The reporting mechanism shall have the capability to graphically provide the energy consumption for each end-use category required by Section C405.10.2 at least every hour, day, month, and year for the previous 36 months.

**REASON FOR COMMENT AND RECOMMENDED CHANGES:**

* This code language is already a mandatory requirement under Section C405.6.1 and DEC Statement 2016-033. Adding the rules to the FBC-EC will assist the users of the code by not having to go to the ASHRAE 90.1 Standard to find these requirements.
* This exact language will be included in the 2021 IECC-C with the approval of CE215-19.
* II.

**TAC/EN Recommendation:**

**TAC/E Recommendation:**

**Commission Action:**

EN/E-CE-Ch.4- Comment #8

Bryan P. Holland, MCP, AStd.

Southern Region Field Representative

**. Add Section C405.10**

**C405.10 Automatic Receptacle Control (Mandatory).** The following shall have automatic receptacle controls complying with Section C405.10.1:

1. At least 50% of all 125 V, 15 and 20-amp receptacles installed in enclosed offices, conference rooms, rooms used primarily for copy or print functions, breakrooms, classrooms, and individual workstations, including those installed in modular partitions and module office workstation systems.

2. At least 25% of branch circuit feeders installed for modular furniture not shown on the construction documents.

**C405.10.1 Automatic receptacle control function.** Automatic receptacle control shall comply with the following:

1. Either split controlled receptacles shall be provided, with the top receptacle controlled, or a controlled receptacle shall be located within 12 inches of each uncontrolled receptacle.

2. Shall be controlled by one of the following methods:

2.1 A scheduled basis using a time-of-day operated control device that turns receptacle power off at specific programmed times and can be programmed separately for each day of the week. The control device shall be configured to provide an independent schedule for each portion of the building of not more than 5000 sqft. and not more than one floor. The occupant shall be able to manually override an area for not more than two hours. Any individual override switch shall control the receptacles of not more than 5000 ft.

2.2. An occupant sensor control that shall turn receptacles off within 20 minutes of all occupants leaving a space; or

2.3. An automated signal from another control or alarm system that shall turn receptacles off within 20 minutes after determining that the area is unoccupied.

3. All controlled receptacles shall be permanently marked in accordance with NFPA 70 and be uniformly distributed throughout the space.

4. Plug-in devices shall not comply.

**Exceptions:** Automatic receptacle controls are not required for the following:

1. Receptacles specifically designated for equipment requiring continuous operation (24/day, 365 days/year).

2. Spaces where an automatic control would endanger the safety or security of the room or building occupants.

3. Within a single modular office workstation, non-controlled receptacles are permitted to be located more than 12 inches, but not more than 72 inches from the controlled receptacles serving that workstation**.**

**REASON FOR COMMENT AND RECOMMENDED CHANGES:**

* This code language is already a mandatory requirement under Section C405.6.1 and DEC Statement 2016-033. Adding the rules to the FBC-EC will assist the users of the code by not having to go to the ASHRAE 90.1 Standard to find these requirements.
* This exact language will be included in the 2021 IECC-C with the approval of CE216-19.

**TAC/EN Recommendation:**

**TAC/E Recommendation:**

**Commission Action:**

EN-CE-Ch.4- Comment #9

Bryan P. Holland, MCP, AStd.

Southern Region Field Representative

**Revise Section C406.3**

**C406.3 Reduced lighting power density.**

The total connected interior lighting power ~~(watts) of the building shall be determined by using~~ calculated in accordance with Section C405.4.1 shall be less 90 percent of the total lighting power ~~values specified in Table C405.4.2(1) times the floor area for the building types, or by using 90 percent of the interior lighting power~~ allowance calculated ~~by the Space-by-Space Method in~~ in accordance with Section C405.4.2.

**REASON FOR COMMENT AND RECOMMENDED CHANGES:**

* This change is necessary to align with the approved changes to C405.4.1 and C405.4.2 under EN7325.
* This is a purely editorial change and makes no technical revisions to the rule as current written.

**TAC Recommendation:**

**Commission Action:**

EN-CE-Ch.4- Comment #10

**From:** Amanda Hickman [mailto:amanda@thehickmangroup.com]
**Sent:** Thursday, January 2, 2020 5:11 PM
**To:** Madani, Mo
**Cc:** The Hickman Group
**Subject:** Updated comment

Hi Mo,

Attached is the updated comment that we discussed.  Let me know if you have any questions.

Thanks!

Amanda

Amanda Hickman
President/Consultant

**This Comment is intended to replace the current language in sections: C402.1, C403.2.14, C403.2.15, C403.2.16, C403.2.17 of the FL code. It is also intended to replace the language revisions of Mods: 8137 and 8139.**

**Delete and replace as noted:**

**~~C403.2.14 Refrigeration equipment performance.~~**

~~Refrigeration equipment, as defined in 10  CFR part 431,have an energy use in kWh/day not greater than the values of Tables C403.2.14(1)and C403.2.14(2) when tested and rated in accordance with AHRI Standard 120010  CFR part 431.The energy use shall be verified through certification under an approved certification program or, where a certification program does not exist, the energy use shall be supported by data furnished by the equipment manufacturer.~~

~~TABLE C403.2.14(1)~~

~~MINIMUM EFFICIENCY REQUIREMENTS: COMMERCIAL REFRIGERATION~~

|  |  |  |  |
| --- | --- | --- | --- |
| **~~EQUIPMENT TYPE~~** | **~~APPLICATION~~** | **~~ENERGY USE LIMITS~~****~~(kWh per day)~~~~a~~** | **~~TEST PROCEDURE~~** |
| ~~Refrigerator with solid doors~~ | ~~Holding Temperature~~ | ~~0.10 • V + 2.04~~ | ~~AHRI 1200~~~~10 CFR Part 431~~ |
| ~~Refrigerator with transparent doors~~ | ~~0.12 • V + 3.34~~ |
| ~~Freezers with solid doors~~ | ~~0.40 • V + 1.38~~ |
| ~~Freezers with transparent doors~~ | ~~0.75 • V + 4.10~~ |
| ~~Refrigerators/freezers with solid doors~~ | ~~the greater of 0.12 · V + 3.34~~~~0.27AV-0.71 or 0.70~~ |
| ~~Commercial refrigerators~~ | ~~Pulldown~~ | ~~0.126 • V + 3.51~~ |

~~1. a.V = volume of the chiller or frozen compartment as defined in AHAM-HRF-1.~~

**~~TABLE C403.2.14(2) MINIMUM EFFICIENCY REQUIREMENTS: COMMERCIAL REFRIGERATORS AND FREEZERS~~**

|  |  |  |
| --- | --- | --- |
| **~~EQUIPMENT TYPE~~** | **~~ENERGY USE LIMITS~~****~~(kWh/day)~~~~a,b~~** | **~~TEST~~****~~PROCEDURE~~** |
| **~~Equipment Classc~~** | **~~Family Code~~** | **~~Operating Mode~~** | **~~Rating Temperature~~** |
| ~~VOP.RC.M~~ | ~~Vertical open~~ | ~~Remote condensing~~ | ~~Medium~~ | ~~0.82 • TDA + 4.07~~ | ~~AHRI 1200~~~~10 CFR Part 431~~ |
| ~~SVO.RC.M~~ | ~~Semivertical open~~ | ~~Remote condensing~~ | ~~Medium~~ | ~~0.83 • TDA + 3.18~~ |
| ~~HZO.RC.M~~ | ~~Horizontal open~~ | ~~Remote condensing~~ | ~~Medium~~ | ~~0.35 • TDA + 2.88~~ |
| ~~VOP.RC.L~~ | ~~Vertical open~~ | ~~Remote condensing~~ | ~~Low~~ | ~~2.27 • TDA + 6.85~~ |
| ~~HZO.RC.L~~ | ~~Horizontal open~~ | ~~Remote condensing~~ | ~~Low~~ | ~~0.57 • TDA + 6.88~~ |
| ~~VCT.RC.M~~ | ~~Vertical transparent door~~ | ~~Remote condensing~~ | ~~Medium~~ | ~~0.22 TDA + 1.95~~ |
| ~~VCT.RC.L~~ | ~~Vertical transparent door~~ | ~~Remote condensing~~ | ~~Low~~ | ~~0.56 • TDA + 2.61~~ |
| ~~SOC.RC.M~~ | ~~Service over counter~~ | ~~Remote condensing~~ | ~~Medium~~ | ~~0.51 • TDA + 0.11~~ |
| ~~VOP.SC.M~~ | ~~Vertical open~~ | ~~Self-contained~~ | ~~Medium~~ | ~~1.74 • TDA + 4.71~~ |
| ~~SVO.SC.M~~ | ~~Semivertical open~~ | ~~Self-contained~~ | ~~Medium~~ | ~~1.73 • TDA + 4.59~~ |
| ~~HZO.SC.M~~ | ~~Horizontal open~~ | ~~Self-contained~~ | ~~Medium~~ | ~~0.77 • TDA + 5.55~~ |
| ~~HZO.SC.L~~ | ~~Horizontal open~~ | ~~Self-contained~~ | ~~Low~~ | ~~1.92 • TDA + 7.08~~ |
| ~~VCT.SC.I~~ | ~~Vertical transparent door~~ | ~~Self-contained~~ | ~~Ice cream~~ | ~~0.67 • TDA + 3.29~~ |
| ~~VCS.SC.I~~ | ~~Vertical solid door~~ | ~~Self-contained~~ | ~~Ice cream~~ | ~~0.38 • V + 0.88~~ |
| ~~HCT.SC.I~~ | ~~Horizontal transparent door~~ | ~~Self-contained~~ | ~~Ice cream~~ | ~~0.56 • TDA + 0.43~~ |
| ~~SVO.RC.L~~ | ~~Semivertical open~~ | ~~Remote condensing~~ | ~~Low~~ | ~~2.27 • TDA + 6.85~~ |
| ~~VOP.RC.I~~ | ~~Vertical open~~ | ~~Remote condensing~~ | ~~Ice cream~~ | ~~2.89 • TDA + 8.7~~ |
| ~~SVO.RC.I~~ | ~~Semivertical open~~ | ~~Remote condensing~~ | ~~Ice cream~~ | ~~2.89 • TDA + 8.7~~ |
| ~~HZO.RC.I~~ | ~~Horizontal open~~ | ~~Remote condensing~~ | ~~Ice cream~~ | ~~0.72 • TDA + 8.74~~ |
| ~~VCT.RC.I~~ | ~~Vertical transparent door~~ | ~~Remote condensing~~ | ~~Ice cream~~ | ~~0.66 • TDA + 3.05~~ |
| ~~HCT.RC.M~~ | ~~Horizontal transparent door~~ | ~~Remote condensing~~ | ~~Medium~~ | ~~0.16 • TDA + 0.13~~ |
| ~~HCT.RC.L~~ | ~~Horizontal transparent door~~ | ~~Remote condensing~~ | ~~Low~~ | ~~0.34 • TDA + 0.26~~ |
| ~~HCT.RC.I~~ | ~~Horizontal transparent door~~ | ~~Remote condensing~~ | ~~Ice cream~~ | ~~0.4 • TDA + 0.31~~ |
| ~~VCS.RC.M~~ | ~~Vertical solid door~~ | ~~Remote condensing~~ | ~~Medium~~ | ~~0.11 • V + 0.26~~ |
| ~~VCS.RC.L~~ | ~~Vertical solid door~~ | ~~Remote condensing~~ | ~~Low~~ | ~~0.23 • V + 0.54~~ |
| ~~VCS.RC.I~~ | ~~Vertical solid door~~ | ~~Remote condensing~~ | ~~Ice cream~~ | ~~0.27 • V + 0.63~~ |
| ~~HCS.RC.M~~ | ~~Horizontal solid door~~ | ~~Remote condensing~~ | ~~Medium~~ | ~~0.11 • V + 0.26~~ |
| ~~HCS.RC.L~~ | ~~Horizontal solid door~~ | ~~Remote condensing~~ | ~~Low~~ | ~~0.23 • V + 0.54~~ |
| ~~HCS.RC.I~~ | ~~Horizontal solid door~~ | ~~Remote condensing~~ | ~~Ice cream~~ | ~~0.27 • V + 0.63~~ |
| ~~HCS.RC.I~~ | ~~Horizontal solid door~~ | ~~Remote condensing~~ | ~~Ice cream~~ | ~~0.27 • V + 0.63~~ |
| ~~SOC.RC.L~~ | ~~Service over counter~~ | ~~Remote condensing~~ | ~~Low~~ | ~~1.08 • TDA + 0.22~~ |
| ~~SOC.RC.I~~ | ~~Service over counter~~ | ~~Remote condensing~~ | ~~Ice cream~~ | ~~1.26 • TDA + 0.26~~ |
| ~~VOP.SC.L~~ | ~~Vertical open~~ | ~~Self-contained~~ | ~~Low~~ | ~~4.37 • TDA + 11.82~~ |
| ~~VOP.SC.I~~ | ~~Vertical open~~ | ~~Self-contained~~ | ~~Ice cream~~ | ~~5.55 • TDA + 15.02~~ |
| ~~SVO.SC.L~~ | ~~Semivertical open~~ | ~~Self-contained~~ | ~~Low~~ | ~~4.34 • TDA + 11.51~~ |
| ~~SVO.SC.I~~ | ~~Semivertical open~~ | ~~Self-contained~~ | ~~Ice cream~~ | ~~5.52 • TDA + 14.63~~ |
| ~~HZO.SC.I~~ | ~~Horizontal open~~ | ~~Self-contained~~ | ~~Ice cream~~ | ~~2.44 • TDA + 9.0~~ |
| ~~SOC.SC.I~~ | ~~Service over counter~~ | ~~Self-contained~~ | ~~Ice cream~~ | ~~1.76 • TDA + 0.36~~ |
| ~~HCS.SC.I~~ | ~~Horizontal solid door~~ | ~~Self-contained~~ | ~~Ice cream~~ | ~~0.38 • V + 0.88~~ |

~~a.V = Volume of the case, as measured in accordance with Appendix C of AHRI 1200.~~

~~b.TDA = Total display area of the case, as measured in accordance with Appendix D of AHRI 1200.~~

~~c.Equipment class designations consist of a combination [(in sequential order separated by periods (AAA).(BB).(C))] of:~~

~~(AAA)An equipment family code where:~~

~~VOP     =          vertical open~~

~~SVO     =          semivertical open~~

~~HZO     =          horizontal open~~

~~VCT     =          vertical transparent doors~~

~~VCS     =          vertical solid doors~~

~~HCT     =          horizontal transparent doors~~

~~HCS     =          horizontal solid doors~~

~~SOC     =          service over counter~~

~~(BB)    An operating mode code:~~

~~RC       =          remote condensing~~

~~SC        =          self-contained~~

~~(C)      A rating temperature code:~~

~~M         =          medium temperature (38°F)~~

~~L          =          low temperature (0°F)~~

~~I           =          ice-cream temperature (15°F)~~

~~For example, “VOP.RC.M” refers to the “vertical-open, remote-condensing, medium-temperature” equipment class.~~

**~~C403.2.15 Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers.~~**

*~~Refrigerated warehouse coolers~~*~~and~~*~~refrigerated warehouse freezers~~*~~shall comply with this section.~~*~~Walk-in coolers~~*~~and~~*~~walk-in freezers~~*~~that are not either site assembled or site constructed shall comply with the following:~~

~~Exception: Walk-in coolers and walk-in freezers regulated under federal law by the Department of Energy in 10 CFR 431, Subpart R - Walk-in Coolers and Walk-in Freezers.~~

~~1. Be equipped with automatic door-closers that firmly close walk-in doors~~

~~that have been closed to within 1 inch (25 mm) of full closure.~~

~~Exception: Automatic closers are not required for doors more than 45 inches (1143 mm) in width or more than 7 feet (2134 mm) in height.~~

~~2. Doorways shall have strip doors, curtains, spring hinged doors or other method of minimizing infiltration when doors are open.~~

~~3. Walk-in coolers and refrigerated warehouse coolers shall contain wall, ceiling, and door insulation of not less than R-25 and walk-in freezers and refrigerated warehouse freezers shall contain wall, ceiling and door insulation of not less than R-32.~~

~~Exception: Glazed portions of doors or structural members need not be insulated.~~

~~4. Walk-in freezers shall contain floor insulation of not less than R-28.~~

~~5. Transparent reach-in doors for walk-in freezers and windows in walk-in freezer doors shall be of triple-pane glass, either filled with inert gas or with heat-reflective treated glass.~~

~~6. Windows and transparent reach-in doors for walk-in coolers shall be of double-pane or triple pane, inert gas-filled, heat-reflective treated glass.~~

~~7. Evaporator fan motors that are less than 1 hp (0.746 kW) and less than 460 volts shall use electronically commutated motors, brushless direct current motors, or 3-phase motors.~~

~~8. Condenser fan motors that are less than 1 hp (0.746 kW) shall use electronically commutated motors, permanent split capacitor-type motors or 3-phase motors.~~

~~9. Where antisweat heaters without antisweat heater controls are provided, they shall have a total door rail, glass and frame heater power draw of not more than 7.1 W/ft2 (76 W/m2) of door opening for walk-in freezersand 3.0 W/ft2 (32 W/m2) of door opening for walk-in coolers.~~

~~10. Where antisweat heater controls are provided, they shall reduce the energy use of the antisweat heater as a function of the relative humidity in the air outside the door or to the condensation on the inner glass pane.~~

~~11. Lights in walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall either use light sources with an efficacy of not less than 40 lumens per watt, including ballast losses, or shall use light sources with an efficacy of not less than 40 lumens per watt, including ballast losses, in conjunction with a device that turns off the lights within 15 minutes when the space is not occupied.~~

**~~C403.2.16 Walk-in coolers and walk-in freezers.~~**

~~Site-assembled or site-constructed~~*~~walk-in coolers~~*~~and~~*~~walk-in freezers~~*~~shall comply with the following:~~

~~Exception: Walk-in coolers and walk-in freezers regulated under federal law by the Department of Energy in 10 CFR 431, Subpart R - Walk-in Coolers and Walk-in Freezers.~~

~~1. Automatic door closers shall be provided that fully close walk-in doors that have been closed to within 1 inch (25 mm) of full closure.~~

**~~Exception:~~**~~Closers are not required for doors more than 45 inches (1143 mm) in width or more than 7 feet (2134 mm) in height.~~

~~2. Doorways shall be provided with strip doors, curtains, spring-hinged doors or other method of minimizing infiltration when the doors are open.~~

~~3. Walls shall be provided with insulation having a thermal resistance of not less than R-25, ceilings shall be provided with insulation having a thermal resistance of not less than R-25 and doors of~~*~~walk-in coolers~~*~~and~~*~~walk-in freezers~~*~~shall be provided with insulation having a thermal resistance of not less than R-32.~~

**~~Exception:~~**~~Insulation is not required for glazed portions of doors or at structural members associated with the walls, ceiling or door frame.~~

~~4. The floor of~~*~~walk-in freezers~~*~~shall be provided with insulation having a thermal resistance of not less than R-28.~~

~~5. Transparent reach-in doors for and windows in opaque~~*~~walk-in freezer~~*~~doors shall be provided with triple-pane glass having the interstitial spaces filled with inert gas or provided with heat-reflective treated glass.~~

~~6. Transparent reach-in doors for and windows in opaque~~*~~walk-in cooler~~*~~doors shall be double-pane heat-reflective treated glass having the interstitial space gas filled.~~

~~7. Evaporator fan motors that are less than 1 hp (0.746 kW) and less than 460 volts shall be electronically commutated motors or 3-phase motors.~~

~~8. Condenser fan motors that are less than 1 hp (0.746 kW) in capacity shall be of the electronically commutated or permanent split capacitor-type or shall be 3-phase motors.~~

**~~Exception:~~**~~Fan motors in~~*~~walk-in coolers~~*~~and~~*~~walk-in freezers~~*~~combined in a single enclosure greater than 3,000 square feet (279 m~~~~2~~~~) in floor area are exempt.~~

~~9. Antisweat heaters that are not provided with antisweat heater controls shall have a total door rail, glass and frame heater power draw not greater than 7.1 W/ft~~~~2~~~~(76 W/m~~~~2~~~~) of door opening for~~*~~walk-in freezers~~*~~, and not greater than 3.0 W/ft~~~~2~~~~(32 W/m~~~~2~~~~) of door opening for~~*~~walk-in coolers~~*~~.~~

~~10. Antisweat heater controls shall be capable of reducing the energy use of the antisweat heater as a function of the relative humidity in the air outside the door or to the condensation on the inner glass pane.~~

~~11. Light sources shall have an efficacy of not less than 40 lumens per Watt, including any ballast losses, or shall be provided with a device that automatically turns off the lights within 15 minutes of when the~~*~~walk-in cooler~~*~~or~~*~~walk-in freezer~~*~~was last occupied.~~

**~~C403.2.17 Refrigerated display cases.~~**

~~Site-assembled or site-constructed refrigerated display cases shall comply with the following:~~

~~Exception: Refrigerated display cases regulated under federal law by the Department of Energy in 10 CFR 431, Subpart C - Commercial Refrigerators, Freezers and Refrigerator-Freezers.~~

~~1. Lighting and glass doors in refrigerated display cases shall be controlled by one of the following:~~

~~1.1 Time switch controls to turn off lights during nonbusiness hours. Timed overrides for display cases shall turn the lights on for up to 1 hour and shall automatically time out to turn the lights off.~~

~~1.2 Motion sensor controls on each display case section that reduce lighting power by at least 50 percent within 3 minutes after the area within the sensor range is vacated.~~

~~2. Low-temperature display cases shall incorporate temperature-based defrost termination control with a time-limit default. The defrost cycle shall terminate first on an upper temperature limit breach and second upon a time limit breach.~~

~~3. Antisweat heater controls shall reduce the energy use of the antisweat heater as a function of the relative humidity in the air outside the door or to the condensation on the inner glass pane.~~

~~(EN8137)~~

**~~C403.2.16.1 Performance standards.~~** ~~Effective January 1, 2020, walk-in coolers and walk-in freezers shall meet the requirements of Tables C403.2.16.1(1), C403.2.16.1(2) and C403.2.16.1(3)~~

**~~TABLE C403.2.16.1(1)~~**

 **~~Walk-in Cooler and Freezer Display Doors Efficiency Requirements~~**

|  |  |  |
| --- | --- | --- |
| ~~Class Descriptor~~ | ~~Class~~ | ~~Maximum Energy Consumption (kWh/day)~~~~a~~ |
| ~~Display Door, Medium Temperature~~ | ~~DD, M~~ | ~~0.04 x A~~~~dd~~ ~~+ 0.41~~ |
| ~~Display Door, Low Temperature~~ | ~~DD, L~~ | ~~0.15 x A~~~~dd~~ ~~+ 0.29~~ |

~~a. Add is the surface area of the display door.~~

**~~TABLE C403.2.16.1(2)~~**

**~~Walk-in Cooler and Freezer Non-Display Doors Efficiency Requirements~~**

|  |  |  |
| --- | --- | --- |
| ~~Class Descriptor~~ | ~~Class~~ | ~~Maximum Energy Consumption (kWh/day)~~~~a~~ |
| ~~Passage Door, Medium Temperature~~ | ~~PD, M~~ | ~~0.05 x A~~~~nd~~ ~~+ 1.7~~ |
| ~~Passage Door, Low Temperature~~ | ~~PD, L~~ | ~~0.14 x A~~~~nd~~ ~~+ 4.8~~ |
| ~~Freight Door, Medium Temperature~~ | ~~PD, M~~ | ~~0.04 x A~~~~nd~~ ~~+ 1.9~~ |
| ~~Freight Door, Medium Temperature~~ | ~~PD, L~~ | ~~0.12 x A~~~~nd~~ ~~+ 5.6~~ |

**~~TABLE C403.2.16.1(3)~~**

**~~Walk-in Cooler and Freezer Refrigeration Systems Efficiency Requirements~~**

|  |  |  |
| --- | --- | --- |
| ~~Class Descriptor~~ | ~~Class~~ | ~~Minimum Annual Walk-In Energy Factor AWEF (Btu/W-h)~~ |
| ~~Dedicated Condensing, Medium Temperature, Indoor System~~ | ~~DC.M.I~~ | ~~5.61~~ |
| ~~Dedicated Condensing, Medium Temperature, Indoor System, > 9,000 Btu/h Capacity~~ | ~~DC.M.I, > 9,000~~ | ~~5.61~~ |
| ~~Dedicated Condensing, Medium Temperature, Outdoor System~~ | ~~DC.M.I~~ | ~~7.60~~ |
| ~~Dedicated Condensing, Medium Temperature, Outdoor System, > 9,000 Btu/h Capacity~~ | ~~DC.M.I, > 9,000~~ | ~~7.60~~ |

**Revise and replace with the following:**

**C402.1 General (Prescriptive).**

Building thermal envelope assemblies for buildings that are intended to comply with the code on a prescriptive basis in accordance with the compliance path described in Item 2 of Section C401.2, shall comply with the following:

1. The opaque portions of the building thermal envelope shall comply with the specific insulation requirements of Section C402.2 and the thermal requirements of either the R-value-based method of Section C402.1.3; the U-, C- and F-factor-based method of Section C402.1.4; or the component performance alternative of Section C402.1.5.

2. Roof solar reflectance and thermal emittance shall comply with Section C402.3.

3. Fenestration in building envelope assemblies shall comply with Section C402.4.

4. Air leakage of building envelope assemblies shall comply with Section C402.5.

Alternatively, where buildings have a vertical fenestration area or skylight area exceeding that allowed in Section C402.4, the building and building thermal envelope shall comply with Section C401.2, Item 1 or Section C401.2, Item 3.

Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with Section C403.2.14.

**C403.2.14 Refrigeration equipment performance.**

Refrigeration equipment performance shall be determined in accordance with sections C403.2.14.1 and C403.2.14.2 for commercial refrigerators, freezers, refrigerator-freezers, walk-in coolers, walk-in freezers and refrigeration equipment. The energy use shall be verified through certification under an approved certification program or, where a certification program does not exist, the energy use shall be supported by data furnished by the equipment manufacturer.

Exception: Walk-in coolers and walk-in freezers regulated under federal law in accordance with Subpart R of 10 CFR 431.

**C403.2.14.1 Commercial refrigerators, freezers, refrigerator-freezers and refrigeration (Mandatory).** Refrigeration equipment, defined in U.S. 10 CFR part 431.62, shall have an energy use in kWh/day not greater than the values of Table C403.2.14.1(1) when tested and rated in accordance with AHRI Standard 1200.

**TABLE C403.2.14.1(1) MINIMUM EFFICIENCY REQUIREMENTS: COMMERCIAL REFRIGERATORS AND FREEZERS AND REFRIGERATION**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Equipment Category | Condensing Unit Conﬁguration | Equipment Family | Rating Temp (F) | Operating Temp (F) | Equipment Classiﬁcationc | Maximum daily energy consumption kWh/day d,e | Test Standard |
| Remote Condensing Commercial Refrigerators and Commercial Freezers | Remote (RC) | Vertical Open (VOP) | 38 (M) | ≥32 | VOP.RC.M | 0.64 x TDA+4.07 | AHRI 1200 |
| 0 (L) | <32 | VOP.RC.L | 2.20 x TDA +6.85 |
| Semivertical Open (SVO) | 38 (M) | ≥32 | SVO.RC.M | 0.66 x TDA+ 3.18 |
| 0 (L) | <32 | SVO.RC.L | 2.20 x TDA +6.85 |
| Horizontal Open (HZO) | 38 (M) | ≥32 | HZO.RC.M | 0.35 x TDA +2.88 |
| 0 (L) | <32 | HZO.RC.L | 0.55 x TDA +6.88 |
| Vertical Closed Transparent (VCT) | 38 (M) | ≥32 | VCT.RC.M | 0.15 x TDA +1.95 |
| 0 (L) | <32 | VCT.RC.L | 0.49 x TDA +2.61 |
| Horizontal Closed Transparent (HCT) | 38 (M) | ≥32 | HCT.RC.M | 0.16 x TDA +0.13 |
| 0 (L) | <32 | HCT.RC.L | 0.34 x TDA +0.26 |
| Vertical Closed Solid (VCS) | 38 (M) | ≥32 | VCS.RC.M | 0.10 x V +0.26 |
| 0 (L) | <32 | VCS.RC.L | 0.21 x V +0.54 |
| Horizontal Closed Solid (HCS) | 38 (M) | ≥32 | HCS.RC.M | 0.10 x V+0.26 |
| 0 (L) | <32 | HCS.RC.L | 0.21 x V +0.54 |
| Service Over Counter (SOC) | 38 (M) | ≥32 | SOC.RC.M | 0.44 x TDA +0.11 |
| 0 (L) | <32 | SOC.RC.L | 0.93 x TDA +0.22 |
|  |  | Vertical Open | 38 (M) | ≥32 | VOP.SCSV.M | 1.69 x TDA + 4.71 |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Self-Contained Commercial Refrigerators and Commercial Freezers with and Without Doors | Self- Contained (SC) | (VOP) | 0 (L) | <32 |  | TDA + 11.82 | AHRI 1200 |
| Semivertical Open (SVO) | 38 (M) | ≥32 | SVO.SC.M | 1.70 x TDA +4.59 |
| 0 (L) | <32 | SVO.SC.L | 4.26 x TDA+11.51 |
| Horizontal Open (HZO) | 38 (M) | ≥32 | HZO.SC.M | 0.72 x TDA +5.55 |
| 0 (L) | <32 | HZO.SC.L | 1.90 x TDA +7.08 |
| Vertical Closed Transparent (VCT) | 38 (M) | ≥32 | VCT.SC.M | 0.10 x V +0.86 |
| 0 (L) | <32 | VCT.SC.L | 0.29 x V+2.95 |
| Vertical Closed Solid (VCS) | 38 (M) | ≥32 | VCS.SC.M | 0.05 x V +1.36 |
| 0 (L) | <32 | VCS.SC.L | 0.22 x V +1.38 |
| Horizontal Closed Transparent (HCT) | 38 (M) | ≥32 | HCT.SC.M | 0.06 x V +0.37 |
| 0 (L) | <32 | HCT.SC.L | 0.08 x V +1.23 |
| Horizontal Closed Solid (HCS) | 38 (M) | ≥32 | HCS.SC.M | 0.05 x V +0.91 |
| 0 (L) | <32 | HCS.SC.L | 0.06 x V +1.12 |
| Service Over Counter (SOC) | 38 (M) | ≥32 | SOC.SC.M | 0.52 x TDA +1.00 |
| 0 (L) | <32 | SOC.SC.L | 1.10 x TDA +2.10 |
| Self-Contained Commercial Refrigerators with Transparent Doors for Pull-Down Temperature Applications | Self- Contained (SC) | Pull-Down (PD) | 38 (M) | ≥32 | PD.SC.M | 0.11 x V +0.81 | AHRI 1200 |
|  | Remote (RC) | Vertical Open (VOP) | -15 (I) | ≤-5b | VOP.RC.I | 2.79 x TDA +8.70 | AHRI 1200 |
| Semivertical Open (SVO) | -15 (I) | ≤-5b | SVO.RC.I | 2.79 x TDA +8.70 |
| Horizontal Open (HZO) | -15 (I) | ≤-5 b | HZO.RC.I | 0.7 x TDA +8.74 |
| Vertical Closed Transparent (VCT) | -15 (I) | ≤-5 b | VCT.RC.I | 0.58 x TDA +3.05 |
| Horizontal Closed Transparent (HCT) | -15 (I) | ≤-5 b | HCT.RC.I | 0.4 x TDA +0.31 |
| Vertical Closed Solid (VCS) | -15 (I) | ≤-5 b | VCS.RC.I | 0.25 x V +0.63 |
| Horizontal Closed Solid (HCS) | -15 (I) | ≤-5 b | HCS.RC.I | 0.25 x V +0.63 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Commercial Ice-Cream Freezers |  | Service Over Counter (SOC) | -15 (I) | ≤-5 b | SOC.RC.I | 1.09 x TDA + 0.26 |  |
| Self- Contained (SC) | Vertical Open (VOP) | -15 (I) | ≤-5 b | VOP.SC.I | 5.4 x TDA +15.02 | AHRI 1200 |
| Semivertical Open (SVO) | -15 (I) | ≤-5 b | SVO.SC.I | 5.41 x TDA +14.63 |
| Horizontal Open (HZO) | -15 (I) | ≤-5 b | HZO.SC.I | 2.42 x TDA9.00 |
| Vertical Closed Transparent (VCT) | -15 (I) | ≤-5 b | VCT.SC.I | 0.62 xTDA + 3.29 |
| Horizontal Closed Transparent (HCT) | -15 (I) | ≤-5 b | HCT.SC.I | 0.56 x TDA +0.43 |
| Vertical Closed Solid(VCS) | -15 (I) | ≤-5 b | VCS.SC.I | 0.34 × V +0.88. |
| Horizontal Closed Solid(HCS) | -15 (I) | ≤-5 b | HCS.SC.I | 0.34 × V +0.88. |
| Service Over Counter(SOC) | -15 (I) | ≤-5 b | SOC.SC.I | 1.53 x TDA +0.36 |

a. The meaning of the letters in this column is indicated in the columns to the left.

b. Ice-cream freezer is defined in 10 CFR 431.62 as a commercial freezer that is designed to operate at or below −5 °F and that the manufacturer designs, markets, or intends for the storing, displaying, or dispensing of ice cream.

c. Equipment class designations consist of a combination (in sequential order separated by periods (AAA).(BB). (C)) of the following: (AAA)—An equipment family code (VOP = vertical open, SVO = semivertical open, HZO = horizontal open, VCT = vertical closed transparent doors, VCS = vertical closed solid doors, HCT = horizontal closed transparent doors, HCS = horizontal closed solid doors, and SOC = service over counter); (BB)—An operating mode code (RC = remote condensing and SC = self-contained); and (C)—A rating temperature code (M = medium temperature [38°F], L = low temperature [0°F], or I = ice cream temperature [-15°F]). For example, “VOP.RC.M” refers to the “vertical open, remote condensing, medium temperature” equipment class.

d. V is the volume of the case (ft ) as measured in AHRI Standard 1200, Appendix C.

e. TDA is the total display area of the case (ft ) as measured in AHRI Standard 1200, Appendix D.

**C403.2.14.2 Walk-in coolers, walk-in freezers (Mandatory).**

Walk-in cooler and walk-in freezer refrigeration systems, except for walk-in process cooling refrigeration systems as defined in U.S. 10 CFR 431.302, shall meet the requirements of Tables C403.2.14(1), C403.2.14(2), and C403.2.14(3).

**TABLE C403.2.14.2(1) WALK-IN COOLER AND FREEZER DISPLAY DOOR EFFICIENCY REQUIREMENTSa**

|  |  |  |
| --- | --- | --- |
| **CLASS DESCRIPTOR** | **CLASS** | **MAXIMUM ENERGY CONSUMPTION (kWh/day)** |
| Display door, medium temperature | DD, M | 0.04 x Add + 0.41 |
| Display door, low temperature | DD, L | 0.15 x Add + 0.29 |

1. Add is the surface area of the display door.

**TABLE C403.2.14.2(2) WALK-IN COOLER AND FREEZER NONDISPLAY DOOR EFFICIENCY REQUIREMENTSa**

|  |  |  |
| --- | --- | --- |
| **CLASS DESCRIPTOR** | **CLASS** | **MAXIMUM ENERGY CONSUMPTION (kWh/day)** |
| Passage door, medium temperature | PD, M | 0.05 x And + 1.7 |
| Passage door, low temperature | PD, L | 0.14 x And + 4.8 |
| Freight door, medium temperature | FD, M | 0.04 x And + 1.9 |
| Freight door, low temperature | FD, L | 0.12 x And + 5.6 |

1. And is the surface area of the display door.

**TABLE C403.2.14.2(3) WALK-IN COOLER AND FREEZER REFRIGERATION SYSTEM EFFICIENCY REQUIREMENTS**

|  |  |  |  |
| --- | --- | --- | --- |
| **CLASS DESCRIPTOR** | **CLASS** | **MINIMUM ANNUAL WALK-IN ENERGY FACTOR AWEF (Btu/W-h)a** | **TEST PROCEDURE** |
| Dedicated condensing, medium temperature, indoor system | DC.M.I | 5.61 | AHRI 1250 |
| Dedicated condensing, medium temperature, outdoor system | DC.M.O | 7.60 |
| Dedicated condensing, low temperature, indoor system, net capacity (qnet) < 6,500 Btu/h | DC.L.I, < 6,500 | 9.091 x 10-5 x qnet + 1.81 |
| Dedicated condensing, low temperature, indoor system, net capacity (qnet) ≥ 6,500 Btu/h | DC.L.I, ≥ 6,500 | 2.40 |
| Dedicated condensing, low temperature, outdoor system, net capacity (qnet) < 6,500 Btu/h | DC.L.O, < 6,500 | 6.522 x 10-5 x qnet + 2.73 |
| Dedicated condensing, low temperature, outdoor system, net capacity (qnet) ≥ 6,500 Btu/h | DC.L.O, ≥ 6,500 | 3.15 |
| Unit cooler, medium | UC.M | 9.00 |
| Unit cooler, low temperature, net capacity (qnet) < 15,500 Btu/h | UC.L,< 15,500 Btu/h | 1.575 x 10-5 x qnet + 3.91 |
| Unit cooler, low temperature, net capacity (qnet) ≥ 15,500 Btu/h | UC.L,≥ 15,500 Btu/h | 4.15 |

a. qnet is net capacity (Btu/hr) as determined in accordance with AHRI Standard 1250

**Referenced Standards:**

DOE

U.S. 10 Part CFR 431, Subpart R: Commercial Refrigerators, Freezers and Refrigerator-Freezers

AHRI

AHRI 1250-(I-P) 2014: Standard for Performance Rating in Walk-in Coolers and Freezers

**TAC Recommendation:**

**Commission Action:**

EN-CE-Ch.4- Comment #11

(See attachment 2)

**Proposed Modification to the Florida Building Code**

**Modification #: Section 553.73, Fla Stat**

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**Code: FBC-EC**

**Section #: C401**

**Modification to the Florida Building Code.]:**

**SECTION C401**

**GENERAL**

**C401.1 Scope. The provisions in this chapter are applicable to commercial**

***buildings* and their *building sites.***

**C401.2 Application. Commercial building shall comply with one of the following:**

**NO CHANGE TO ITEMS 1, 2, OR 3.**

**C401.2.1 Commissioning. Commercial buildings and tenant spaces shall**

**comply with Section C408 as applicable.**

**C401.2.~~1~~.2 Application to replacement fenestration products.**

**NO CHANGE TO SECTION.**

**Rationale: The current code is unclear as to which commercial buildings are required to comply with the commissioning provisions of the code and how to address tenant spaces for shell construction. The change requires compliance with Section 408 for large mechanical systems and automatic lighting in commercial buildings. Section 408 exempts mechanical systems and service water heater systems where the total mechanical equipment capacity is less than 480,000 Btu/h cooling capacity and 600,000 Btu/h combined service water-heating and space-heating capacity.**

**Fiscal Impact Statement [Provide documentation of the costs and benefits of the proposed modifications to the code for each of the following entities. Cost data should be accompanied by a list of assumptions and supporting documentation. Explain expected benefits.]:**

**A. Impact to local entity relative to enforcement of code:** No cost impact to local code enforcement.

**B. Impact to building and property owners relative to cost of compliance with code:** The provision is applicable to buildings with large systems only. See attached report to the National Conference on Building Commissioning: May 2-4, 2007.

**C. Impact to industry relative to cost of compliance with code:** The provision is applicable to buildings with large systems only.See attached report to the National Conference on Building Commissioning: May 2-4, 2007.

**D. Impact to small business:** The provision is applicable to buildings with large systems only.See attached report to the National Conference on Building Commissioning: May 2-4, 2007.

**Please explain how the proposed modification meets the following requirements:**

1. **Has a reasonable and substantial connection with the health, safety, and welfare of the general public:** The change will improve the

likelihood of compliance with the energy code for commercial buildings by

requiring inspection and functionality testing after the completion of construction.

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1. **Strengthens or improves the code, and provides equivalent or better products, methods, or systems of construction:** The change will

improve the code by increasing the likelihood of compliance with the

energy code for commercial buildings.

1. **Does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities:** The change does not discriminate against materials, products, methods, or systems of construction of demonstrated capabilities.
2. **Does not degrade the effectiveness of the code:** The proposed change does not degrade the effectiveness of the code and improves the effectiveness of the code.

**TAC Recommendation:**

**Commission Action:**

**CHAPTER 5 [CE] EXISTING BUILDINGS**

EN-CE-Ch.5- Comment #1

Bryan P. Holland, MCP, AStd.

Southern Region Field Representative

**Revise Section C503.1**

**C503.1 General.** Alterations to any building or structure shall comply with the requirements of the code for new construction. Alterations shall be such that the existing building or structure is no less conforming to the provisions of this code than the existing building or structure was prior to the alteration. Alterations to an existing building, building system or portion thereof shall conform to the provisions of this code as those provisions relate to new construction without requiring the unaltered portions of the existing building or building system to comply with this code. Alterations shall not create an unsafe or hazardous condition or overload existing building systems.

Alterations complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404 and C405.

**Exception:** The following alterations need not comply with the requirements for new construction, provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.

2. Surface-applied window film installed on existing single-pane fenestration assemblies reducing solar heat gain, provided the code does not require the glazing or fenestration to be replaced.

3. Existing ceiling, wall or floor cavities exposed during construction, provided that these cavities are filled with insulation.

4. Construction where the existing roof, wall or floor cavity is not exposed.

5. Roof recover.

6. Air barriers shall not be required for roof recover and roof replacement where the alterations or renovations to the building do not include alterations, renovations or repairs to the remainder of the building envelope.

~~7. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.~~

**REASON FOR COMMENT AND RECOMMENDED CHANGES:**

* C503.1, Exception #7 is an ERROR. It was never supposed to be included in the code upon the addition of C503.6 that covers lighting alterations. This ERROR has been corrected in the 2018 IBC and needs to be corrected in the 2020 FBC. The continuance of this incorrect exception is in direct conflict with the correct rule in C503.6.

**TAC Recommendation:**

**Commission Action:**

EN-CE-Ch.5- Comment #2

Bryan P. Holland, MCP, AStd.

Southern Region Field Representative

**Revise Section R503.1.4**

**R503.1.4 Lighting.** New lighting systems that are part of the alteration shall comply with Section R404.1.

**Exception:** Alterations that replace less than ~~50~~ 10 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.

**REASON FOR COMMENT AND RECOMMENDED CHANGES:**

* This code change aligns the residential provisions for lighting alterations with those in C503.6 for commercial occupancies.
* The 10% threshold provides allowance for low-efficacy lamps in appliances, legacy lighting products, and other special-use applications.
* This code change will ensure that general lighting used for occupancy of an altered space will meet the lighting efficacy requirements in R404.1.
* This exact language will be included in the 2021 IECC-R with the approval of RE218-19.

**TAC Recommendation:**

**Commission Action:**