AHC Meeting #9
March 21-22, 2013
AHC Possible Code Changes of Interest

The following code changes have been compiled for AHC review and consideration of code changes identified as not pertaining to any of the AHC Work Groups but nonetheless potentially deal with matters of AHC interest. These changes are intended to serve as the agenda for the AHC in order to establish AHC positions, if any, for the upcoming 2013 Group B Committee Action Hearings.

F165–12

907.2.12 (New) (IBC [F] 907.2.12 (New)), 907.12.1 (New) (IBC [F] 907.12.1 (New)), 907.12.2 (New) (IBC [F] 907.12.2 (New), 1103.9 (New), 1103.9.1 (New), 1103.9.2 (New), 1103.9.3 (New); IRC R314.5 (new), R314.5.1 (New), R314.5.2 (New), R314.5.3 (New)

Proponent: David Frederick Scarelli representing DBA-Sentry Signal Company

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IFC COMMITTEE. PART 2 OF THIS PROPOSAL WILL BE HEARD BY THE IRC BUILDING/ENERGY COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THE IFC AND IRC BUILDING/ENERGY CODE DEVELOPMENT COMMITTEES.

Part I - IFC

907.2.12 (IBC [F] 907.2.12) Line type heat detection. A line type heat detection system that activates at 475°F (246°C shall be installed in Group R Occupancies in accordance with Sections 907.2.12.1 through 907.2.12.2, NFPA 72, NFPA 70 and manufacturer's instructions.

907.2.12.1 (IBC [F] 907.2.12.1) Location. Line type heat detection shall be installed in the following locations:

1. Above all NM-B Cable
2. Above all electrical boxes
3. Above or near all raceways.

(Renumber subsequent sections)

907.2.12.2 (IBC [F] 907.2.12.2) Interconnection. The line type heat detection system shall be interconnected with the smoke alarms required by Section 907.2.11 in such a manner that when the line type heat detection activates such detection shall activate the smoke alarms in all sleeping units and dwelling units.

Add new text as follows:

1103.9 Line type heat detection. A line type heat detection system that activates at 475° F (246° C) shall be installed in existing Group R Occupancies in accordance with Sections 1103.9.1 through 1103.9.3, NFPA 72, NFPA 70 and manufacturer's instructions.

1103.9.1 Location. Line type heat detection shall be installed in the following locations:

1. Above all exposed NM-B Cable
2. Above all electrical boxes
3. Above or near all raceways.

1103.9.2 Interconnection. The line type heat detection system shall be interconnected with the smoke alarms required by Section 907.2.11 in such a manner that when the line type heat detection activates such detection shall activate the smoke alarms in all sleeping and dwelling units.

1103.9.3 Power source. In existing construction required line type heat detection shall receive primary power from the building wiring where such wiring is served from a commercial source and shall be equipped with a battery backup.

> **Exception:** Line type heat detection is not required to be equipped with battery backup where connected to an emergency electrical system.

PART II – IRC

Add new text as follows:

R314.5 Line type heat detection. Line type heat detection that activates at 475^0F (246^0C) shall be installed in accordance with Sections 314.5.1 through 314.5.3, NFPA 72, NFPA 70 and manufacturer's instructions.

R314.5.1 Location. Line type heat detection shall be installed in the following locations:

1. Above all NM-B Cable
2. Above all electrical boxes
3. Above or near all raceways

R314.5.2 Interconnection. The line type heat detection shall be interconnected with the smoke alarms in such a manner that when the line type heat detection activates such detection shall activate all of the alarms in the dwelling unit. Where there are two dwelling units the line type heat detection shall be interconnected with the smoke alarms in both dwelling units.

R314.5.3 Power source. Line type heat detection shall receive primary power from the building wiring where such wiring is served from a commercial source and shall be equipped with a battery backup.

> **Exception:** Line type heat detection is not required to be equipped with battery backup where connected to an emergency electrical system.

(Renumber subsequent sections)

Reason:
Part I According to death certificate data, 25% of fire and flame deaths in 2002 were due to smoke inhalation alone, 26% due to burns and 21% to a combination of burns and smoke inhalation. There were 517,000 structural, 3,140 civilian deaths and 17,730 civilian injuries. *(page 37).

ESCAPING – all seemed savable….; SLEEPING – 1/3 estimated as savable; RESCUING OR FIREFIGHTING – ¾ estimated savable…**

Deterioration of electrical wiring caused by time or the environment is a predominant cause of ignition. *(page 24).

Fires in electrical distribution systems contribute significantly to the U.S. fire problem, accounting for a consistent portion of the problem year after year. *(page 69).

In 2006 an estimated 71,360 injuries involving electrical distribution or lighting equipment began with the ignition of products and materials often found in structural areas, including wire or cable insulation (30%), structural members or framing (12%), insulation within the structural area (5%). *(page 6).

Three-fourths (75%) of deaths in 2002-2005 home fires involving electriacal distribution or lighting equipment involved victims who were outside the area of origin when the fire began. (page 6).

Branch circuit wiring (51%) accounted for half of the 2005-2005 non-confined home structure fires involving wiring. *(page 54).

Half (52%) of 2002-2005 non-confined home structure fires involving wiring began in fire areas of origin that are all concealed or exterior spaces. *(page 55).

The majority (57%) of 2002-2005 non-confined home structure fires involving overcurrent protection devices began with ignition wire or cable insulation. *(page 89).

INTENT: THE LINE TYPE HEAT DETECTION SWITCH WILL SOUND THE ALARM AT THE ORIGIN OF FIRE IGNITION WITHIN THE HOME STRUCTURE YILDING THE MAXIMUM TIME THAT MAY BE NECESSARY TO VACATE THE HOME THEREBY MINIMIZING THE INCIDENTS OF CIVILIAN AND FIREFIGHTER INJURIES AND DEATHSP and LOSS OF PROPERTY.

Part II . According to death certificate data, 25% of fire and flame deaths in 2002 were due to smoke inhalation alone, 26% due to burns and 21% to a combination of burns and smoke inhalation. There were 517,000 structural, 3,140 civilian deaths and 17,730 civilian injuries.

ESPCAPING – all seemed savable…; SLEEPING – 1/3 estimated as savable; RESCUING OR FIREFIGHTING - ¾ estimated savable….** Reanalysis of who can be saved.

Deterioration of electrical wiring caused by time or the environment is a predominant cause of ignition.
Fires in electrical distribution systems contribute significantly to the U.S. fire problem, accounting for a consistent portion of the problem year after year.

In 2006 an estimated 71,360 injuries involving electrical distribution or lighting equipment were reported to hospital emergency rooms.

Electrical distributions and lighting equipment dwelling fires are the only type of home fires that have been shown to increase in frequency with increasing dwelling age.

The majority of 2002-2005 non-confined home structure fires involving electrical distribution or lighting equipment began with the ignition of products and materials often found in structural areas, including wire or cable insulation (30%), structural members or framing (12%), and insulation within the structural area (5%).

Three-fourths (75%) of deaths in 2002-2005 home fires involving electrical distribution or lighting equipment involved victims who were outside the area of origin when the fire began.

Branch circuit wiring (51%) accounted for half of the 2002-2005 non-confined home structure fires involving wiring.

Half (52%) of 2002-2005 non-confined home structure fires involving wiring began in fire areas of origin that are all concealed or exterior spaces.

The majority (57%) of 2002-2005 non-confined home structure fires involving overcurrent protection devices began with ignition wire or cable insulation.

SUMMARY: Electrical distribution equipment is a highly significant contributor to the high number of civilian deaths and civilian injuries resulting year after year in home fires. Many lives can be saved and injuries prevented if earlier warning can be sounded.

CONCLUSION: The line type open switch activated by heat and/or fire is designed by earliest warning to prevent death by asphyxiation and burning.

Circuitry short circuits and overloads trip the circuit breakers when the breaker rating is reached. Lower leakage causes hot spots along the line and eventually causes fires that could be detected long before they could become autocatalytic. The line type open switch is designed to detect this hazard long before life is endangered.

Bibliography:

- Characteristics of Home Fire Victims, NFPA, Fire analysis and Research Division. July 2005. Pg 59, John R., Hall Jr.
- "How Many People Can be Saved From Home Fires If Given More Time to Escape? Fire Technology", 40. Pgs 117-126, 2004; John R Hall Jr. Fire Analysis and Research Division, NFPA
- "Statistics from National Electronic Injury Surveillance System (NEISS)". data obtained from the U.S. Consumer Product Safety Commission (CPSC) website, www.cpsc.gov
- Linda E. Smith and Dennis McCoskrie, "What Causes Wiring Fires in Residences?" Fire Journal, Jan/Feb 1990. Volume 84, Number 1
- "Home Structure Fires Involving Electrical Distribution and Lighting Equipment," John R. Hall, Jr., Fire Analysis and Research Division, NFPA, March 2008.

INTENT: The line type heat detection switch will sound the alarm at the origin of fire ignition within the home structure yielding the maximum time that may be necessary to vacate the home thereby minimizing the incidents of civilian and firefighter injuries and deaths; and loss of property.

Cost Impact: This code change will increase the cost of construction.

F200–13
912.3.1 (IBC [F] 912.3.1)

Proponent: Robert Trotter, MCP., Tennessee Code Development Committee (bobtrotter1023@aol.com)

Revise as follows:

912.3.1 (IBC [F] 912.3.1) Locking fire department connection plugs and caps. ~~The *fire code official* is authorized to require~~ Approved, locking plugs or caps shall be provided on every fire department connection~~s~~ for water-based *fire protection systems.* Swivels shall be protected from unauthorized removal. Prior to installation, ~~where~~ the responding fire department shall have ~~carries~~ appropriate key wrenches for removal.

Reason: While many jurisdictions are taking advantage of the current authorization that entered the Code in the 2003 edition, other jurisdictions are in need of more stringent requirements. By removing the authorization and mandating that every FDC be protected by locking plugs or caps, the Code would contain the necessary force of law to require building owners to comply. Under the current economy, the theft of brass FDC's is becoming an epidemic, a real problem that puts firefighters at risk. This proposal provides for the latest "plug" technology to protect FDC's. The health, safety and welfare of the public require FDC protection.

Here are some quotes from recently published news articles that should shock the conscience and prove there is a problem that this proposal will correct.

http://sacramento.cbslocal.com **Thieves Stripping Parts Out Of Fire Systems**
Metal thieves are stripping small but critical pieces out of fire sprinklers, and fire officials worry the trend could create a bigger fire danger and end up costing lives.

http://www.pnwlocalnews.com **Metal thieves stealing fire connections from area business and apartments**
This type of theft has been rampant throughout the Puget Sound area even though a connection, which costs a business between $400 and $1,500 to replace, only gets thieves $15 to $25 each at a salvage yard. The danger to the public and to a business is during a fire. If the FDC is missing, firefighters will not be able to supplement the sprinkler system or get water to firefighting crews inside the building of multistory businesses. This endangers not only the firefighters, but anyone inside the building. Increased damage to the building itself and higher rebuilding costs are also possible.

http://www.beavertonvalleytimes.com **The dark side of recycling**
…Portland Police Bureau that a band of metal thieves had found a lucrative new target: fire department connections (FDCs), the chunky brass fittings used by firefighters to connect their hoses to the internal sprinkler systems of commercial buildings. Detective Mike Malanaphy of the Portland Police Bureau now believes that Sharrow and Guild were responsible for the disappearance of more than 100 FDCs from buildings across the metro area — including the Oregon Humane Society, Legacy Salmon Creek Hospital, and the SmartPark on Southwest 10th Avenue". "It's difficult to assess the damage caused by the thefts, but Malanaphy reckons that $30,000 would be a lowball estimate — and it doesn't take into account the possibility that a missing FDC could cripple firefighters in the event of a blaze. The pair's profit from reselling the brass? About $3,000.

Cost Impact: The code change proposal will increase the cost of construction. The cost depends on the type of protection but is not expected to exceed $375 per individual FDC.

CE195–13

C403.1, C403.2, C403.2.3, Table C403.2.3(7), Table C403.2.3(8), Table C403.2.3(9), C403.2.3.1, C403.2.3.2, C403.2.4, C403.2.5.1, C403.2.10, C403.2.10.1, C403.2.10.2, Table C403.2.10.1(1), Table C403.2.10.1(2), C403.3, C403.3.2, C403.4 thru C403.4.6, C403.4.1.3, C403.4.7, C406.2, Table C406.2(6), Table C406.2(7), Chapter 5

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.1 General. Mechanical systems and equipment serving all or a portion of the building heating, cooling or ventilating needs that are unitary or packaged in nature and serving a single *zone* and controlled by a single thermostat in the *zone* served, or are two-pipe heating only systems serving one or more *zones*, shall comply with Section~~s~~ 403.2 (~~referred to as the~~ mandatory provisions) and ~~either:~~

~~1. Section~~ C403.3 (~~Simple systems~~ prescriptive provisions).~~; or~~

~~2. Section C403.4 (Complex systems~~ All other mechanical systems or equipment shall meet the provisions of Section 6 of *ANSI/ASHRAE/IES Standard 90.1*.

C403.2 Mechanical systems and equipment ~~Provisions applicable to all mechanical systems~~ (Mandatory). Mechanical systems and equipment serving the building heating, cooling or ventilating needs shall comply with Sections C403.2.1 through C403.2.11.

C403.2.3 HVAC equipment performance requirements. Equipment shall meet the minimum efficiency requirements of Tables C403.2.3(1), C403.2.3(2), C403.2.3(3), C403.2.3(4), C403.2.3(5)~~,~~ and C403.2.3(6)~~, C403.2.3(7) and C403.2.3(8)~~ when tested and rated in accordance with the applicable test procedure. ~~Plate-type liquid-to-liquid heat exchangers shall meet the minimum requirements of Table C403.2.3(9).~~ The efficiency shall be verified through certification under an *approved* certification program or, if no certification program exists, the equipment efficiency ratings shall be supported by data furnished by the manufacturer. Where multiple rating conditions or performance requirements are provided, the equipment shall satisfy all stated requirements. Where components, such as indoor or outdoor coils from different manufacturers are used, calculations and supporting data shall be furnished by the designer that demonstrates that the combined efficiency of the specified components meets the requirements herein.

~~**TABLE C403.2.3(7)**~~
~~**MINIMUM EFFICIENCY REQUIREMENTS:**~~
~~**WATER CHILLING PACKAGES**[a]~~

~~**TABLE C403.2.3(8)**~~
~~**MINIMUM EFFICIENCY REQUIREMENTS:**~~
~~**HEAT REJECTION EQUIPMENT**~~

~~**TABLE C403.2.3(9)**~~
~~**HEAT TRANSFER EQUIPMENT**~~

~~**C403.2.3.1 Water-cooled centrifugal chilling packages.** Equipment not designed for operation at AHRI Standard 550/590 test conditions of 44°F (7°C) leaving chilled-water temperature and 85°F (29°C) entering condenser water temperature with 3 gpm/ton (0.054 l/s · kW) condenser water flow shall have maximum full-load kW/ton and *NPLV* ratings adjusted using Equations 4-3 and 4-4.~~

~~Adjusted minimum full-load COP ratings =~~
~~(Full-load COP from Table 6.8.1C of AHRI Standard 550/590) × K_{adj}~~
~~**(Equation 4-3)**~~

~~Adjusted minimum NPLV rating =~~
~~(IPLV from Table 6.8.1C of AHRI Standard 550/590) × K_{adj}~~
~~**(Equation 4-4)**~~

~~where:~~

~~K_{adj} = A × B~~

~~A = $0.0000015318 \times (LIFT)^4 - 0.000202076 \times (LIFT)^3 + 0.0101800 \times (LIFT)^2 - 0.264958 \times LIFT + 3.930196$~~

~~B = $0.0027 \times L_{vg}^{Evap}$ (°C) + 0.982~~

~~LIFT = $L_{vg}^{Cond} - L_{vg}^{Evap}$~~

~~L_{vg}^{Cond} = Full-load condenser leaving water temp-erature (°C)~~

~~L_{vg}^{Evap} = Full-load leaving evaporator temperature (°C)~~

~~SI units shall be used in the K_{adj} equation.~~

~~The adjusted full-load and *NPLV* values shall only be applicable for centrifugal chillers meeting all of the following full-load design ranges:~~

~~1. The leaving evaporator fluid temperature is not less than 36°F (2.2°C).~~

~~2. The leaving condenser fluid temperature is not greater than 115°F (46.1°C).~~

~~3. LIFT is not less than 20°F (11.1 °C) and not greater than 80°F (44.4°C).~~

~~**Exception:** Centrifugal chillers designed to operate outside of these ranges need not comply with this code.~~

~~**C403.2.3.2 Positive displacement (air- and water-cooled) chilling packages.** Equipment with a leaving fluid temperature higher than 32°F (0°C), shall meet the requirements of Table C403.2.3(7) when tested or certified with water at standard rating conditions, in accordance with the referenced test procedure.~~

C403.2.4 HVAC system controls. Each heating and cooling system shall be provided with thermostatic controls as specified in Section C403.2.4.1, C403.2.4.2, C403.2.4.3~~,~~ and C403.2.4.4~~, C403.4.1, C403.4.2, C403.4.3 or C403.4.4~~.

C403.2.5.1 Demand controlled ventilation. Demand control ventilation (DCV) shall be provided for spaces larger than 500 square feet (50 m^2) and with an average occupant load of 25 people per 1000 square feet (93 m^2) of floor area (as established in Table 403.3 of the *International Mechanical Code*) and served by systems with one or more of the following:

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

Exception: Demand control ventilation is not required for systems and spaces as follows:

1. Systems with energy recovery complying with Section C403.2.6.
2. ~~Multiple-*zone* systems without direct digital control of individual *zones* communicating with a central control panel.~~
3. System with a design outdoor airflow less than 1,200 cfm (600 L/s).
4. Spaces where the supply airflow rate minus any makeup or outgoing transfer air requirement is less than 1,200 cfm (600 L/s).
5. Ventilation provided for process loads only.

C403.2.10 Air system design ~~and control~~. Each HVAC system having a total fan system motor nameplate horsepower (hp) exceeding 5 horsepower (hp) (3.7 kW) ~~shall meet the provisions of Sections C403.2.10.1 through C403.2.10.2~~ at fan system design conditions shall ~~not exceed the allowable~~ have a maximum *fan system motor nameplate hp* of 0.0011 X CFMs, where CFMs is the maximum design supply airflow rate to conditioned spaces served by the system in cubic feet per minute. ~~(Option 1) or *fan system bhp* (Option 2) as shown in Table C403.2.10.1(1).~~ This includes supply fans~~,~~ and return/relief fans~~, and fan-powered terminal units~~ associated with systems providing heating or cooling capability. ~~Single-*zone* variable-air-volume systems shall comply with the constant volume fan power limitation.~~

Exception:

~~1. Hospital, vivarium and laboratory systems that utilize flow control devices on exhaust and/or return to maintain space pressure relationships necessary for occupant health and safety or environmental control shall be permitted to use variable volume fan power limitation.~~

~~2.~~ Individual exhaust fans with motor nameplate horsepower of 1 hp or less.

~~**C403.2.10.1 Allowable fan floor horsepower.** Each HVAC system at fan system design conditions shall not exceed the allowable *fan system motor nameplate hp* (Option 1) or *fan system bhp* (Option 2) as~~

~~shown in Table C403.2.10.1(1). This includes supply fans, return/relief fans, and fan powered terminal units associated with systems providing heating or cooling capability. Single *zone* variable-air-volume systems shall comply with the constant volume fan power limitation.~~

~~**Exception:** The following fan systems are exempt from allowable fan floor horsepower requirement.~~

~~1. Hospital, vivarium and laboratory systems that utilize flow control devices on exhaust and/or return to maintain space pressure relationships necessary for occupant health and safety or environmental control shall be permitted to use variable volume fan power limitation.~~
~~2. Individual exhaust fans with motor nameplate horsepower of 1 hp or less.~~

~~**C403.2.10.2 Motor nameplate horsepower.** For each fan, the selected fan motor shall be no larger than the first available motor size greater than the brake horsepower (bhp). The fan brake horsepower (bhp) shall be indicated on the design documents to allow for compliance verification by the *code official*.~~

~~**Exceptions:**~~

~~1. For fans less than 6 bhp (4413 W), where the first available motor larger than the brake horsepower has a nameplate rating within 50 percent of the bhp, selection of the next larger nameplate motor size is allowed.~~
~~2. For fans 6 bhp (4413 W) and larger, where the first available motor larger than the bhp has a nameplate rating within 30 percent of the bhp, selection of the next larger nameplate motor size is allowed.~~

~~**TABLE C403.2.10.1(1)**~~
~~**FAN POWER LIMITATION**~~

~~**TABLE C403.2.10.1(2)**~~
~~**FAN POWER LIMITATION PRESSURE DROP ADJUSTMENT**~~

~~**C403.3 Simple HVAC systems and equipment (Prescriptive).** This section applies to buildings served by unitary or packaged HVAC equipment listed in Tables C403.2.3(1) through C403.2.3(8), each serving one *zone* and controlled by a single thermostat in the *zone* served. It also applies to two-pipe heating systems serving one or more *zones*, where no cooling system is installed.~~
C403.3 Mechanical systems and equipment (Prescriptive). Mechanical systems and equipment serving the building heating, cooling and ventilation needs shall comply with Sections C403.3.1 and C403.3.2.

C403.3.2 Hydronic system~~s~~ ~~controls~~. Hydronic heating systems comprised of multiple-packaged boilers and designed to deliver conditioned water or steam into a common distribution system shall include automatic controls capable of sequencing operation of the boilers and to automatically reduce flow through the boiler plant when another boiler is shut down. Hydronic heating systems comprised of a single boiler having an input design capacity over 500,000 Btu/h (146,550W) shall include either a multi-staging or modulating burner.

Hydronic systems of at least 300,000 Btu/h (87,930 W) design output capacity supplying heated ~~and chilled~~ water to comfort conditioning systems shall be designed for variable fluid flow with control valves designed to modulate or step down, and close, as a function of load and include controls that ~~meet the requirements of Sections~~ C403.4.3:

1. Automatically reset the supply water temperatures using zone-return water temperature, building-return water temperature, zone loads, or outside air temperature as an indicator of building heating demand. The temperature shall be capable of being reset by at least 25 percent of the design supply-to-return water temperature difference; and

2. Reduce system pump flow by at least 50 percent of design flow rate utilizing adjustable speed drive(s) on pump(s), or multiple-stated pumps where at least one-half of the total pump horsepower is capable of being automatically turned off.

~~**C403.4.1.3**~~ **C403.3.1.1.5 Integrated economizer control.** Economizer systems shall be integrated with the mechanical cooling system and be capable of providing partial cooling even where additional mechanical cooling is required to meet the remainder of the cooling load.

Exceptions:

1. Direct expansion systems that include controls that reduce the quantity of *outdoor air* required to prevent coil frosting at the lowest step of compressor unloading, provided this lowest step is no greater than 25 percent of the total system capacity.
2. Individual direct expansion units that have a rated cooling capacity less than 54,000 Btu/h (15 827 W) and use nonintegrated economizer controls that preclude simultaneous operation of the economizer and mechanical cooling.

~~**C403.4 Complex HVAC systems and equipment. (Prescriptive).** This section applies to buildings served by HVAC equipment and systems not covered in Section C403.3.~~

~~**C403.4.1 Economizers.** Economizers shall comply with Sections C403.4.1.1 through C403.4.1.4.~~

~~**C403.4.1.1 Design capacity.** Water economizer systems shall be capable of cooling supply air by indirect evaporation and providing up to 100 percent of the expected system cooling load at *outdoor air* temperatures of 50°F dry bulb (10°C dry bulb)/45°F wet bulb (7.2°C wet bulb) and below.~~
~~**Exception:** Systems in which a water economizer is used and where dehumidification requirements cannot be met using outdoor air temperatures of 50°F dry bulb (10°C dry bulb)/45°F wet bulb (7.2°C wet bulb) shall satisfy 100 percent of the expected system cooling load at 45°F dry bulb (7.2°C dry bulb)/40°F wet bulb (4.5°C wet bulb).~~

~~**C403.4.1.2 Maximum pressure drop.** Precooling coils and water-to-water heat exchangers used as part of a water economizer system shall either have a water-side pressure drop of less than 15 feet (4572 mm) of water or a secondary loop shall be created so that the coil or heat exchanger pressure drop is not seen by the circulating pumps when the system is in the normal cooling (noneconomizer) mode.~~
~~**C403.4.1.3 Integrated economizer control.** Economizer systems shall be integrated with the mechanical cooling system and be capable of providing partial cooling even where additional mechanical cooling is required to meet the remainder of the cooling load.~~

~~**Exceptions:**~~

~~1. Direct expansion systems that include controls that reduce the quantity of *outdoor air* required to prevent coil frosting at the lowest step of compressor unloading, provided this lowest step is no greater than 25 percent of the total system capacity.~~
~~2. Individual direct expansion units that have a rated cooling capacity less than 54,000 Btu/h (15 827 W) and use nonintegrated economizer controls that preclude simultaneous operation of the economizer and mechanical cooling.~~

~~**C403.4.1.4 Economizer heating system impact.** HVAC system design and economizer controls shall be such that economizer operation does not increase the building heating energy use during normal operation.~~

~~**Exception:** Economizers on VAV systems that cause *zone* level heating to increase due to a reduction in supply air temperature.~~

~~**C403.4.2 Variable air volume (VAV) fan control.** Individual VAV fans with motors of 7.5 horsepower (5.6 kW) or greater shall be:~~

1. Driven by a mechanical or electrical variable speed drive;
2. Driven by a vane-axial fan with variable-pitch blades; or
3. The fan shall have controls or devices that will result in fan motor demand of no more than 30 percent of their design wattage at 50 percent of design airflow when static pressure set point equals one-third of the total design static pressure, based on manufacturer's certified fan data.

C403.4.2.1 Static pressure sensor location. Static pressure sensors used to control VAV fans shall be placed in a position such that the controller setpoint is no greater than one-third the total design fan static pressure, except for systems with *zone* reset control complying with Section C403.4.2.2. For sensors installed down-stream of major duct splits, at least one sensor shall be located on each major branch to ensure that static pressure can be maintained in each branch.

C403.4.2.2 Set points for direct digital control. For systems with direct digital control of individual *zone* boxes reporting to the central control panel, the static pressure set point shall be reset based on the *zone* requiring the most pressure, i.e., the set point is reset lower until one *zone* damper is nearly wide open.

C403.4.3 Hydronic systems controls. The heating of fluids that have been previously mechanically cooled and the cooling of fluids that have been previously mechanically heated shall be limited in accordance with Sections C403.4.3.1 through C403.4.3.3. Hydronic heating systems comprised of multiple packaged boilers and designed to deliver conditioned water or steam into a common distribution system shall include automatic controls capable of sequencing operation of the boilers. Hydronic heating systems comprised of a single boiler and greater than 500,000 Btu/h (146 550 W) input design capacity shall include either a multistaged or modulating burner.

C403.4.3.1 Three-pipe system. Hydronic systems that use a common return system for both hot water and chilled water are prohibited.

C403.4.3.2 Two-pipe changeover system. Systems that use a common distribution system to supply both heated and chilled water shall be designed to allow a dead band between changeover from one mode to the other of at least 15°F (8.3°C) outside air temperatures; be designed to and provided with controls that will allow operation in one mode for at least 4 hours before changing over to the other mode; and be provided with controls that allow heating and cooling supply temperatures at the changeover point to be no more than 30°F (16.7°C) apart.

C403.4.3.3 Hydronic (water loop) heat pump systems. Hydronic heat pump systems shall comply with Sections C403.4.3.3.1 through C403.4.3.3.3.

C403.4.3.3.1 Temperature dead band. Hydronic heat pumps connected to a common heat pump water loop with central devices for heat rejection and heat addition shall have controls that are capable of providing a heat pump water supply temperature dead band of at least 20°F (11.1°C) between initiation of heat rejection and heat addition by the central devices.

Exception: Where a system loop temperature optimization controller is installed and can determine the most efficient operating temperature based on realtime conditions of demand and capacity, dead bands of less than 20°F (11°C) shall be permitted.

C403.4.3.3.2 Heat rejection. Heat rejection equipment shall comply with Sections C403.4.3.3.2.1 and C403.4.3.3.2.2.

Exception: Where it can be demonstrated that a heat pump system will be required to reject heat throughout the year.

C403.4.3.3.2.1 Climate Zones 3 and 4. For Climate Zones 3 and 4:

1. If a closed-circuit cooling tower is used directly in the heat pump loop, either an automatic valve shall be installed to bypass all but a minimal flow of water around the tower, or lower leakage positive closure dampers shall be provided.
2. If an open-circuit tower is used directly in the heat pump loop, an automatic valve shall be installed to bypass all heat pump water flow around the tower.
3. If an open- or closed-circuit cooling tower is used in conjunction with a separate heat exchanger to isolate the cooling tower from the heat pump loop, then heat loss shall be controlled by shutting down the circulation pump on the cooling tower loop.

C403.4.3.3.2.2 Climate Zones 5 through 8. For Climate Zones 5 through 8, if an open- or closed-circuit cooling tower is used, then a separate heat exchanger shall be provided to isolate the cooling tower from the heat pump loop, and heat loss shall be controlled by shutting down the circulation pump on the cooling tower loop and providing an automatic valve to stop the flow of fluid.

C403.4.3.3.3 Two position valve. Each hydronic heat pump on the hydronic system having a total pump system power exceeding 10 horsepower (hp) (7.5 kW) shall have a two-position valve.

C403.4.3.4 Part load controls. Hydronic systems greater than or equal to 300,000 Btu/h (87 930 W) in design output capacity supplying heated or chilled water to comfort conditioning systems shall include controls that have the capability to:

1. Automatically reset the supply water temperatures using zone return water temperature, building return water temperature, or outside air temperature as an indicator of building heating or cooling demand. The temperature shall be capable of being reset by at least 25 percent of the design supply to return water temperature difference; or
2. Reduce system pump flow by at least 50 percent of design flow rate utilizing adjustable speed drive(s) on pump(s), or multiple-staged pumps where at least one-half of the total pump horsepower is capable of being automatically turned off or control valves designed to modulate or step down, and close, as a function of load, or other *approved* means.

C403.4.3.5 Pump isolation. Chilled water plants including more than one chiller shall have the capability to reduce flow automatically through the chiller plant when a chiller is shut down. Chillers piped in series for the purpose of increased temperature differential shall be considered as one chiller.

Boiler plants including more than one boiler shall have the capability to reduce flow automatically through the boiler plant when a boiler is shut down.

C403.4.4 Heat rejection equipment fan speed control. Each fan powered by a motor of 7.5 hp (5.6 kW) or larger shall have the capability to operate that fan at two-thirds of full speed or less, and shall have controls that automatically change the fan speed to control the leaving fluid temperature or condensing temperature/pressure of the heat rejection device.

Exception: Factory-installed heat rejection devices within HVAC equipment tested and rated in accordance with Tables C403.2.3(6) and C403.2.3(7).

C403.4.5 Requirements for complex mechanical systems serving multiple zones. Sections C403.4.5.1 through C403.4.5.4 shall apply to complex mechanical systems serving multiple zones. Supply air systems serving multiple zones shall be VAV systems which, during periods of occupancy, are designed and capable of being controlled to reduce primary air supply to each *zone* to one of the following before reheating, recooling or mixing takes place:

1. Thirty percent of the maximum supply air to each *zone*.
2. Three hundred cfm (142 L/s) or less where the maximum flow rate is less than 10 percent of the total fan system supply airflow rate.
3. The minimum ventilation requirements of Chapter 4 of the *International Mechanical Code*.

Exception: The following define where individual *zones* or where entire air distribution systems are exempted from the requirement for VAV control:

1. *Zones* where special pressurization relationships or cross-contamination requirements are such that VAV systems are impractical.
2. *Zones* or supply air systems where at least 75 percent of the energy for reheating or for providing warm air in mixing systems is provided from a site-recovered or site-solar energy source.
3. *Zones* where special humidity levels are required to satisfy process needs.
4. *Zones* with a peak supply air quantity of 300 cfm (142 L/s) or less and where the flow rate is less than 10 percent of the total fan system supply airflow rate.
5. *Zones* where the volume of air to be reheated, recooled or mixed is no greater than the volume of outside air required to meet the minimum ventilation requirements of Chapter 4 of the *International Mechanical Code*.
6. *Zones* or supply air systems with thermostatic and humidistatic controls capable of operating in sequence the supply of heating and cooling energy to the *zones* and which are capable of preventing reheating, recooling, mixing or simultaneous supply of air that has been previously cooled, either mechanically or through the use of economizer systems, and air that has been previously mechanically heated.

C403.4.5.1 Single duct variable air volume (VAV) systems, terminal devices. Single duct VAV systems shall use terminal devices capable of reducing the supply of primary supply air before reheating or recooling takes place.

C403.4.5.2 Dual duct and mixing VAV systems, terminal devices. Systems that have one warm air duct and one cool air duct shall use terminal devices which are capable of reducing the flow from one duct to a minimum before mixing of air from the other duct takes place.

C403.4.5.3 Single fan dual duct and mixing VAV systems, economizers. Individual dual duct or mixing heating and cooling systems with a single fan and with total capacities greater than 90,000 Btu/h [(26 375 W) 7.5 tons] shall not be equipped with air economizers.

C403.4.5.4 Supply-air temperature reset controls. Multiple *zone* HVAC systems shall include controls that automatically reset the supply-air temperature in response to representative building loads, or to outdoor air temperature. The controls shall be capable of resetting the supply air temperature at least 25 percent of the difference between the design supply-air temperature and the design room air temperature.

Exceptions:

1. Systems that prevent reheating, recooling or mixing of heated and cooled supply air.
2. Seventy five percent of the energy for reheating is from site-recovered or site solar energy sources.
3. Zones with peak supply air quantities of 300 cfm (142 L/s) or less.

C403.4.6 Heat recovery for service water heating. Condenser heat recovery shall be installed for heating or reheating of service hot water provided the facility operates 24 hours a day, the total installed heat capacity of water-cooled systems exceeds 6,000,000 Btu/hr (1 758 600 W) of heat rejection, and the design service water heating load exceeds 1,000,000 Btu/h (293 100 W).

The required heat recovery system shall have the capacity to provide the smaller of:

1. Sixty percent of the peak heat rejection load at design conditions; or
2. The preheating required to raise the peak service hot water draw to 85°F (29°C).

Exceptions:

1. Facilities that employ condenser heat recovery for space heating or reheat purposes with a heat recovery design exceeding 30 percent of the peak water-cooled condenser load at design conditions.

~~2. Facilities that provide 60 percent of their service water heating from site solar or site recovered energy or from other sources.~~

~~C403.4.7~~ C403.3.2 Hot gas bypass limitation. Cooling systems shall not use hot gas bypass or other evaporator pressure control systems unless the system is designed with multiple steps of unloading or continuous capacity modulation. The capacity of the hot gas bypass shall be limited as indicated in Table C403.4.7

Exception: Unitary packaged systems with cooling capacities not greater than 90,000 Btu/h (26 379 W).

TABLE ~~C403.4.7~~ C403.3.2
MAXIMUM HOT GAS BYPASS CAPACITY

RATED CAPACITY	MAXIMUM HOT GAS BYPASS CAPACITY (% of total capacity)
≤ 240,000 Btu/h	50
> 240,000 Btu/h	25

For SI: 1 British thermal unit per hour = 0.2931 W.

C406.2 Efficient HVAC performance. For systems required by Sections 403.1 to meet provisions of Sections C403.2 (mandatory provisions) and C403.3 (prescriptive provisions), equipment shall meet the minimum efficiency requirements of Tables C406.2.(1) through C406.2(~~7~~ 5) in addition to the requirements in Section C403. This section shall only be used where the equipment efficiencies in Tables C406.2(1) through C406.2(~~7~~ 5) are greater than the equipment efficiencies listed in Table C403.2.3(1) through 403.2.3(~~7~~ 6) for the equipment type.

For systems required by Sections 403.1 to meet provisions of Section 6 of *ANSI/ASHRAE/IES Standard 90.1* heating and cooling equipment shall have a rated efficiency 10% greater than required by Section 6 of *ANSI/ASHRAE/IES Standard 90.1*.

~~TABLE C406.2(6)~~
~~CHILLERS—EFFICIENCY REQUIREMENTS~~

~~TABLE C406.2(7)~~
~~ABSORPTION CHILLERS—EFFICIENCY REQUIREMENTS~~

Delete standard from Chapter 5 as follows:

AHRI

~~400—01 Liquid to Liquid Heat Exchangers with Addendum 2~~
~~550/590—03 Water Chilling Packages Using the Vapor Compression Cycle—with Addenda~~
~~560—00 Absorption Water Chilling and Water-heating Packages~~

~~**CTI** Cooling Technology Institute~~
~~2611 FM 1960 West, Suite A-101~~
~~Houston, TX 77068~~

~~ATC 105 (00) Acceptance Test Code for Water Cooling Tower~~
~~STD 201—09 Standard for Certification of Water Cooling Towers Thermal Performances~~

Reason: The code change retains all the provisions of Section C403 of the 2012 IECC as applicable to simple HVAC systems and equipment as currently defined in the IECC, with some minor modifications for hydronic systems. Note that a significant majority of

the commercial buildings constructed in the United States are on the order of 20,000 square feet or less in floor area and would likely be covered by these resultant provisions for simple systems and equipment.

The provisions for complex (e.g. non-simple) HVAC systems are updated and maintained by ASHRAE on a regular and ongoing basis. It seems duplicative and time consuming to try and keep the provisions of the IECC for such equipment and systems consistent with Standard 90.1, when so much effort is spent in SSPC 90.1 updating and maintaining these provisions. A review of the past few code development cycles finds very few changes were submitted to the provisions for complex systems other than to keep the IECC consistent with the provisions in Standard 90.1.

While there may be an advantage in having the provisions for complex systems provided directly in the IECC to foster their availability, such complex systems will have a registered design professional or engineer involved in the design and construction who should be providing sealed plans and specifications. Given the recent emphasis on the availability of resources for state and local code compliance verification efforts it seems reasonable to rely on Standard 90.1 for the criteria for such systems and equipment and the engineers and design professionals that would be involved in their implementation and compliance verification via their professional credentials.

An important note is that this is not a return to the prior "mix and match" approach of allowing developers to meet one section (e.g., envelope) in the IECC and another (say lighting) in ASHRAE 90.1. This is a clear referral and not an optional choice. Simple HVAC system provisions are in the IECC and the complex system requirements in ASHRAE 90.1 are included by reference. There is always the option of using ASHRAE 90.1 for the entire compliance path under section 401.2 or 401.2.1, but in either case, complex HVAC systems would be subject to requirements in ASHRAE 90.1.

This change will greatly simplify the code and as noted above continue to provide criteria for more complex systems through a singular process. Details to foster an understanding of this code change are provided below and correspond to each of the ten specific actions needed to implement this change and further simplify the provisions in the ICC for HVAC systems and equipment.

1. The proposed changes to C403.1 are intended to bring forward the scope of C403.3 for simple systems to the beginning of C403 to provide the necessary outline and structure for the resultant C403. Section C403.1 now clearly indicates what is covered by the building mechanical system provisions, what constitutes a simple HVAC system and equipment, and that such systems and equipment would need to comply with the provisions of the IECC and those that are not would now be required to comply with ANSI/ASHRAE/IES Standard 90.1 as currently referenced in the IECC. This eliminates the need to maintain separate and parallel provisions for other than simple systems in the IECC that are maintained in Standard 90.1.
2. The title of C403.2 requires revision to ensure the correct organization of the provisions of C403. Section C403.1 now establishes the scope of the provisions for simple HVAC systems and equipment. The sections after C403.1 apply to mechanical systems and equipment and are either mandatory (C403.2) or prescriptive (C403.3). If HVAC systems and equipment are not simple, as defined in C403.1, then the provisions of Standard 90.1 apply.
3. The scope of C403 as simple HVAC systems and equipment covering only unitary or packaged cooling equipment eliminates the relevance of Tables C403.2.3(7), and C403.2.3(8) which apply to equipment associated with complex systems as defined in the IECC now (e.g. non-simple). These same provisions are provided in Standard 90.1 and need not be provided here. By referencing Standard 90.1, it is unnecessary for IECC to undergo several code changes in order to keep the code consistent with Standard 90.1.
4. Sections C403.2.3.1 and C403.2.3.2 apply to water chilling packages that are associated with systems other than those covered by Section C403 pursuant to this change (e.g. non-simple systems that are now covered by Standard 90.1).
5. Sections C403.4.1 through C403.4.4 are deleted through this code change as discussed above and no longer need to be referenced. The provisions of C403.2.4.1 through C403.2.4.4 apply to simple HVAC systems and equipment and should be retained as currently presented.
6. Exception 2 to C403.2.5.1 would not be applicable to the scope of C403 as proposed herein (simple systems) because simple HVAC systems and equipment are limited to serving a singular zone and this exception applies to multiple zone systems.
7. In now applying to simple systems the provisions in C403.2.10.1 for fan system brake horsepower are no longer applicable and would be addressed in Standard 90.1. Table C403.2.10.1(1) can be deleted as the one remaining set of provisions is better presented in a textual rather than tabular form. Table C403.2.10.1(2) is deleted as it is only applicable to the brake horsepower path which is no longer present for the simplified path. What remains is a set of provisions for air system fan horsepower that can be stated in a singular section through modification to C403.2.10. The title of C403.2.10 is revised so it does not contain now nor would it contain any provisions on air system control.
8. With the movement of the current provisions of C403.3 to C403.1 to address the scope of C403 at the beginning of the section, the current performance provisions in C403.3 for simple systems need an appropriate introductory section.
9. The current hydronic system control provisions in Section C403.3.2 are modified for consistency with the scope of the proposed Section C403 and do not apply to chilled water systems. In addition, Section C403.4 would be deleted in deference to Standard 90.1 for complex (e.g. non-simple) HVAC systems and equipment as discussed above. The controls provisions now in Section C403.4 are brought forward as applicable to simple HVAC systems and equipment. The provisions applicable to hydronic systems covered by the new Section C403.3 (heating only systems) are Sections C403.4.3.4 and the second paragraph of Section C403.4.3.5, both of which are included in the code change above as new text to Section C403.3.2 on hydronic systems. There are minor modifications to improve pumping efficiency by requiring variable flow on smaller systems without variable speed drives being required.
10. The economizer integration requirements are currently located in C403.4.1.3 for complex systems and are applicable to simple systems as defined pursuant to this code change. As a consequence they need to be retained in the IECC and are proposed to be moved so they are retained for simple systems.
11. Unneeded complex system sections and tables are deleted. ASHRAE 90.1 becomes the reference for these systems.
12. Hot gas bypass restrictions are retained, as they apply to some larger simple systems.
13. The HVAC option in C406.2 needs to be adjusted to accommodate the reference to Standard 90.1 for complex systems. As proposed, Section C403 provides specific criteria within the IECC for simple mechanical systems and then defers to Standard 90.1 for complex systems in lieu of providing specific criteria within the IECC for complex systems. The

provisions of C406.2 as written would and should continue to be applied over and above the specific criteria within the IECC. In now referencing Standard 90.1 for complex systems, a parallel option must also exist for those buildings that would comply using the specific criteria within the IECC but in the case of mechanical systems would defer to Standard 90.1.

14. High efficiency chiller tables are no longer required, as the high efficiency chiller option is indexed to ASHRAE 90.1.
15. Several reference standards are no longer required.

Any cost impact would be attributable to the loss of the provisions in Section C403.4 for complex HVAC systems and the impact of requiring compliance with ANSI/ASHRAE/IES Standard 90.1 alone on any particular system design. A comparison of the provisions in Section C403.4 and Standard 90.1 would have to be conducted and applied to each design to determine if there are any specific increases or decreases in first cost and life cycle costs. There should be little cost difference between the current complex provisions and the 90.1 complex provisions if the trend for ASHRAE 90.1 proposals to be incorporated into IECC continues. ASHRAE 90.1 proposals typically go through a cost effectiveness vetting as they are released for public comment and incorporation into standard 90.1, so any differences with increased cost would be cost effective.

Cost Impact: There is no significant impact on construction cost.

CE231–13

C403.2.10, C403.2.10.1, Table C403.2.10.1(1), Table C403.2.10.1(2)

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Delete without substitution as follows:

~~**C403.2.10 Air system design and control.** Each HVAC system having a total fan system motor nameplate horsepower (hp) exceeding 5 horsepower (hp) (3.7 kW) shall meet the provisions of Sections C403.2.10.1 through C403.2.10.2.~~

~~**C403.2.10.1 Allowable fan floor horsepower.** Each HVAC system at fan system design conditions shall not exceed the allowable fan system motor nameplate hp (Option 1) or fan system bhp (Option 2) as shown in Table C403.2.10.1(1). This includes supply fans, return/relief fans, and fan-powered terminal units associated with systems providing heating or cooling capability. Single zone variable-air-volume systems shall comply with the constant volume fan power limitation.~~

~~**Exception:** The following fan systems are exempt from allowable fan floor horsepower requirement.~~

1. ~~Hospital, vivarium and laboratory systems that utilize flow control devices on exhaust and/or return to maintain space pressure relationships necessary for occupant health and safety or environmental control shall be permitted to use variable volume fan power limitation.~~
2. ~~Individual exhaust fans with motor nameplate horsepower of 1 hp or less.~~

~~**C403.2.10.2 Motor nameplate horsepower.** For each fan, the selected fan motor shall be no larger than the first available motor size greater than the brake horsepower (bhp). The fan brake horsepower (bhp) shall be indicated on the design documents to allow for compliance verification by the code official.~~

~~**Exceptions:**~~

1. ~~For fans less than 6 bhp (4413 W), where the first available motor larger than the brake horsepower has a nameplate rating within 50 percent of the bhp, selection of the next larger nameplate motor size is allowed.~~
2. ~~For fans 6 bhp (4413 W) and larger, where the first available motor larger than the bhp has a nameplate rating within 30 percent of the bhp, selection of the next larger nameplate motor size is allowed.~~

~~**TABLE C403.2.10.1(1)**~~
~~**FAN POWER LIMITATION**~~

~~**TABLE C403.2.10.1(2)**~~
~~**FAN POWER LIMITATION PRESSURE DROP ADJUSTMENT**~~

Reason: Checking the fan horsepower is impractical. This part of the code is seldom enforced, or even taught in class.

Cost Impact: The code change proposal will not increase the cost of construction.

CE235–13
C403.2.10.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.2.10.1 Allowable fan ~~floor~~ horsepower. Each HVAC system at fan system design conditions shall not exceed the allowable *fan system motor nameplate hp* (Option 1) or *fan system bhp* (Option 2) as shown in Table C403.2.10.1(1). This includes supply fans, exhaust fans, return/relief fans, and fan-powered terminal units associated with systems providing heating or cooling capability. Single *zone* variable-air-volume systems shall comply with the constant volume fan power limitation.

Exceptions: ~~The following fan systems are exempt from allowable fan floor horsepower requirement.~~

1. Hospital, vivarium and laboratory systems that utilize flow control devices on exhaust and/or return to maintain space pressure relationships necessary for occupant health and safety or environmental control shall be permitted to use variable volume fan power limitation.
2. Individual exhaust fans with motor nameplate horsepower of 1 hp or less2. Individual exhaust fans with motor nameplate horsepower of 1 hp or less are exempt from the allowable fan horsepower requirement.

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Reason: This proposal involves **e**ditorial clarification and simplification of provisions for allowable fan horsepower. The proposal inserts the words "exhaust fans" that are missing from C403.2.10.1, even though exception 2 is for exhaust fans and the definition for *fan system motor nameplate hp* referred to in the section include exhaust fans. The parent section is clear as to scope (fan horsepower) however the two exceptions have different basis. The first exception allows use of the less strict variable fan formula from the table for certain constant volume systems, while what is covered in the second exemption is a blanket exemption. It is appropriate to delete the introductory reason and provide the extent of exception separately for each exception. The term "floor" does not appear to be appropriate within the context of this section. The intent is to limit fan horsepower so the term floor is removed.

Cost Impact: The code change proposal does not increase the cost of construction.

CE310–13
C405.5.1, C405.5.3 (NEW), Table C405.5.2(1), Table C405.5.2(2)

Proponent: Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers (glenn@lampartners.com)

Revise as follows:

C405.5.1 Total connected interior lighting power. The total connected interior lighting power (watts) shall be the sum of the watts of all interior lighting equipment as determined in accordance with Sections C405.5.1.1 through C405.5.1.4.

Exceptions:

1. The connected power associated with the following lighting equipment is not included in calculating total connected lighting power.
   1.1. Professional sports arena playing field lighting.
   1.2. *Sleeping unit* lighting in hotels, motels, boarding houses or similar buildings, provided that the lighting complies with Section R404.1.

1.3. Emergency lighting automatically off during normal building operation.
1.4. Lighting in spaces specifically designed for use by occupants with special lighting needs including the visually impaired visual impairment and other medical and age-related issues.
1.5. Lighting in interior spaces that have been specifically designated as a registered interior historic landmark.
1.6. Casino gaming areas.
1.7. Mirror lighting in dressing rooms.

(Portions of text not shown remains unchanged)

C405.5.3 Additional interior lighting power. Where using the Space-by-Space Method, an increase in the interior lighting power allowance is permitted for specific lighting functions. Additional power shall be permitted only where the specified lighting is installed and automatically controlled, separately from the general lighting, to be turned off during nonbusiness hours. This additional power shall be used only for the specified luminaires and shall not be used for any other purpose. An increase in the interior lighting power allowance is permitted in the following cases:

1. For spaces in which lighting is specified to be installed in addition to the general lighting for the purpose of decorative appearance or for highlighting art or exhibits, provided that the additional lighting power shall not exceed 1.0 W/ft^2 of such spaces.

TABLE C405.5.2(1)
INTERIOR LIGHTING POWER ALLOWANCES: BUILDING AREA METHOD

BUILDING AREA TYPE	LPD (w/ft2)
Automotive facility	~~0.9~~ 0.80
Convention center	~~1.2~~ 1.01
Courthouse	~~1.2~~ 1.01
Dining: bar lounge/leisure	~~1.3~~ 1.01
Dining: cafeteria/fast food	~~1.4~~ 0.9
Dining: family	~~1.6~~ 0.95
Dormitory	~~1.0~~ 0.57
Exercise center	~~1.0~~ 0.84
Fire station	~~0.8~~ 0.67
Gymnasium	~~1.1~~ 0.94
Health care clinic	~~1.0~~ 0.90
Hospital	~~1.2~~ 1.05
Hotel/Motel	~~1.0~~ 0.87
Library	~~1.3~~ 1.19
Manufacturing facility	~~1.3~~ 1.17

BUILDING AREA TYPE	LPD (w/ft2)
~~Motel~~	~~1.0~~
Motion picture theater	~~1.2~~ 0.76
Multifamily	~~0.7~~ 0.51
Museum	~~1.1~~ 1.02
Office	~~0.9~~ 0.82
Parking garage	~~0.3~~ 0.21
Penitentiary	~~1.0~~ 0.81
Performing arts theater	~~1.6~~ 1.39
Police station	~~1.0~~ 0.87
Post office	~~1.1~~ 0.87
Religious building	~~1.3~~ 1.0
Retail	~~1.4~~ 1.26
School/University	~~1.2~~ 0.87
Sports arena	~~1.1~~ 0.91
Town hall	~~1.1~~ 0.89
Transportation	~~1.0~~ 0.70
Warehouse	~~0.6~~ 0.66
Workshop	~~1.4~~ 1.19

TABLE C405.5.2(2)
INTERIOR LIGHTING POWER ALLOWANCES:
SPACE-BY-SPACE METHOD

COMMON SPACE-BY-SPACE TYPES	LPD (w/ft2)
Atrium ~~First~~ that is < 40 feet in height	0.03 per ft. in total height ~~ht.~~
Atrium - ~~Above~~ that is > 40 feet in height	0.40 + 0.02 per ft. in total height ~~ht.~~
Audience/seating area - permanent For auditorium For performing arts theater For motion picture theater	 ~~0.9~~ 0.63 ~~2.6~~ 2.43 ~~1.2~~ 1.14
Classroom/lecture/training	~~1.30~~ 1.24
Conference/meeting/multipurpose	~~1.2~~ 1.23

Copy/Print room	0.72
Corridor/transition	~~0.7~~ 0.66
Computer Room	1.71
Dining area Bar/lounge/leisure dining Family dining area Cafeteria/Fast Food Dining	 ~~1.40~~ 1.07 ~~1.40~~ 0.89 0.65
Dressing/fitting room in performing arts theater	~~1.1~~ 0.61
Electrical/mechanical	~~1.10~~ 0.42
Emergency Vehicle Garage	0.56
Food preparation	~~1.20~~ 1.21
Laboratory for classrooms	~~1.3~~ 1.43
Laboratory for medical/industrial/research	~~1.8~~ 1.81
Laundry/Washing area	0.60
Loading Dock (interior)	~~0.47~~
Lobby	~~1.10~~ 0.90
Lobby for performing arts theater	~~3.3~~ 2.00
Lobby for motion picture theater	~~1.0~~ 0.59
Lobby - elevator	0.64
Lobby for Hotel	1.06
Locker room	~~0.80~~ 0.75
Lounge/~~ recreation~~ Breakroom	~~0.8~~ 0.73
Office- enclosed	~~1.1~~ 1.11
Office- open plan	~~1.0~~ 0.98
Pharmacy Area	1.68
Restroom	~~1.0~~ 0.98
Sales area	~~1.6~~[a] 1.44
Stairway	~~0.70~~ 0.69
Storage	~~0.8~~ 0.63
Vehicular Maintenance Area	0.67
Workshop	~~1.60~~ 1.59
BUILDING SPECIFIC SPACE-BY-SPACE TYPES	
Courthouse/police station/penitentiary Courtroom Confinement cells ~~Judge chambers~~ Penitentiary audience seating Penitentiary classroom Penitentiary dining	 ~~1.90~~ 1.72 ~~1.1~~ 0.81 ~~1.3~~ ~~0.5~~ 0.28 ~~1.3~~ 1.34 ~~1.1~~ 0.96
~~Automotive- service/repair~~	~~0.70~~

Bank/office- banking activity area	~~1.5~~ 1.01
Dormitory ~~living quarters~~ bedrooms	~~1.10~~ 0.38
Gymnasium/fitness center	
~~Fitness~~ Exercise area	~~0.9~~ 0.72
Gymnasium audience/seating	~~0.40~~ 0.65
Playing area	~~1.40~~ 1.2
Healthcare clinic/hospital	
Corridors/transition	~~1.00~~ 0.99
Exam/treatment	~~1.7~~ 1.66
~~Emergency~~	~~2.70~~
~~Public and staff lounge~~	~~0.80~~
Medical supplies	~~1.40~~ 0.74
Nursery	~~0.9~~ 0.88
Nurse station	~~1.00~~ 0.71
Physical therapy	~~0.90~~ 0.91
Patient room	~~0.70~~ 0.62
~~Pharmacy~~	~~1.20~~
Radiology/imaging	~~1.3~~ 1.51
Operating room	~~2.20~~ 2.48
Recovery	~~1.2~~ 1.15
Lounge/Breakroom	~~0.8~~ 0.92
~~Laundry - washing~~	~~0.60~~
~~Hotel~~	
~~Dining area~~	~~1.30~~
~~Guest rooms~~	~~1.10~~
~~Hotel lobby~~	~~2.10~~
~~Highway lodging dining~~	~~1.20~~
~~Highway lodging guest rooms~~	~~1.10~~
Library	
Stacks	~~1.70~~ 1.71
~~Card file and cataloguing~~	~~1.10~~
Reading area	~~1.20~~ 1.06
Manufacturing	
Corridors/transition	~~0.40~~ 0.41
Detailed manufacturing	~~1.3~~ 1.29
Equipment room	~~1.0~~ 0.74
Extra high bay (>50-foot floor-ceiling height)	
High bay (25-- 50-foot floor-ceiling height)	~~1.1~~ 1.05
Low bay(< 25-foot floor-ceiling height)	
	~~1.20~~ 1.23
	~~1.2~~ 1.19
Museum	
General exhibition	~~1.00~~ 1.05
Restoration	~~1.70~~ 1.02
Parking garage - garage areas	~~0.2~~ 0.19
Convention center	
Exhibit space	~~1.50~~ 1.45
Audience/seating area	~~0.90~~ 0.82

~~Fire stations~~ ~~Engine room~~ Fire Station Sleeping Quarters	~~0.80~~ ~~0.30~~ 0.22
Post office Sorting area	~~0.9~~ 0.94
Religious building Fellowship hall Audience seating Worship pulpit/choir	 ~~0.60~~ 0.64 ~~2.40~~ 1.53 ~~2.40~~ 1.53
Retail Dressing/fitting area Mall concourse Sales area	 ~~0.9~~ 0.71 ~~1.6~~ 1.10 ~~1.6~~ 1.59
Sports arena Audience seating ~~Court sports~~ Playing area - Class 4 ~~Court sports~~ Playing area - Class 3 ~~Court sports~~ Playing area - Class 2 ~~Court sports~~ Playing area - Class 1 ~~Ring sports area~~	 ~~0.4~~ 0.43 ~~0.7~~ 1.20 ~~1.2~~ 1.80 ~~1.9~~ 2.40 ~~3.0~~ 3.68 ~~2.7~~
Transportation Air/train/bus baggage area Airport concourse Terminal - ticket counter	 ~~1.00~~ 0.53 ~~0.60~~ 0.36 ~~1.50~~ 0.80
Warehouse ~~Fine material storage~~ small hand-carried items Medium/bulky material, palletized items	 ~~1.40~~ 0.95 ~~0.60~~ 0.58

(Portions of Table not shown remain unchanged)

Reason: The purpose of this change is to adjust the lighting power density allowances to the best available values. "Best" means values and methodology for determining allowances that will lead to high energy-efficiency while still allowing high-quality lighting and sufficient light levels. We believe that the best source for these values are the models maintained by Pacific Northwest National Lab (PNNL) for the DOE in support of ASHRAE/IES Standard 90.1 development. Recently the models were updated to account for some changes in recommended light levels in the new Lighting Handbook, 10th Edition from the Illuminating Engineering Society (IES). Additionally several new space types were added and some space types renamed or removed for clarity. Also, the Building Area Method values were based on a larger data set with 56% additional representative buildings.

Additional explanation of proposed changes by section:

Exception 1.2 to C405.5.1, (Sleeping Unit exception to lighting power limits)

Sleeping Units should be subject to the same requirements as Dwelling Units and residential buildings covered by Chapter 4 [RE].

Add exception for Mirror Lighting in Dressing Rooms.

Because this exception is in Standard 90.1, we assume that the LPD for Dressing/Fitting Room space types was developed with mirror lighting excluded. Without this exception the LPD limit for Dressing Rooms would be too low.

Add "Additional Interior Lighting Power" section.

This provision is an integral part of the space-by-space method. IECC-2012 already includes the additional power for retail as a footnote to the LPD table. The proposal adds the special allowance for decorative lighting and lighting for art and exhibits. IECC-2012 is missing this allowance, which is why some of the LPD values in IECC-2012 for some space types are higher than 90.1-2010. This allowance is a "use it or lose it" addition that can only be used for certain types of lighting. This provision gives the designer more flexibility but should not result in significant increase or decrease in stringency. The proposed new space-by-space LPD values were developed with the understanding that this additional allowance is available to the designer. The LPDs would not be valid for many space types without this additional allowance.

Revise Building Area Method LPDs (Table C405.5.2(1))

As mentioned above, these proposed values are from current PNNL models. These values were published in the public review draft of Addendum "co" to ASHRAE/IES Standard 90.1.

Revise Space-by-space Method LPDs (Table C405.5.2(2))

As mentioned above, these proposed values and space types are from current PNNL models. These values were published in the public review draft of Addendum "bh" to ASHRAE/IES Standard 90.1. The formatting and the ordering of space types that is in the

IECC-2012 table were changed as little as possible. In order to accommodate the new space types, and the renaming or removal of a few space types, some rearrangement was necessary.

Cost Impact: The code change proposal will not increase the cost of construction.

CE311–13

Table C405.5.2(1), Table C405.5.2(2)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

TABLE C405.5.2(1)
INTERIOR LIGHTING POWER ALLOWANCES:
BUILDING AREA METHOD

BUILDING AREA TYPE[a]	LPD (w/ft^2)
Automotive facility	~~0.9~~ 0.82
Convention center	~~1.2~~1.08
Courthouse	~~1.2~~1.05
Dining: bar lounge/leisure	~~1.3~~0.99
Dining: cafeteria/fast food	~~1.4~~0.90
Dining: family	~~1.6~~0.89
Dormitory	~~1.0~~0.61
Exercise center	~~1.0~~0.88
Fire station	~~0.8~~0.71
Gymnasium	~~1.1~~1.00
Health care clinic	~~1.0~~0.87
Hospital	~~1.2~~1.21
Hotel	~~1.0~~1.00
Library	~~1.3~~1.18
Manufacturing facility	~~1.3~~1.11
Motel	~~1.0~~0.88
Motion picture theater	~~1.2~~0.83
Multifamily	~~0.7~~0.60
Museum	~~1.1~~1.06
Office	0.9
Parking garage	~~0.3~~0.25
~~Penetentiary~~ Penitentiary	~~1.0~~0.97
Performing arts theater	~~1.6~~1.39
Police station	~~1.0~~0.96
Post office	~~1.1~~0.87
Religious building	~~1.3~~1.05

BUILDING AREA TYPE[a]	LPD (w/ft^2)
Retail	~~1.4~~1.40
School/university	~~1.2~~0.99
Sports arena	~~1.1~~0.78
Town hall	~~1.1~~0.92
Transportation	~~1.0~~0.77
Warehouse	~~0.6~~0.66
Workshop	~~1.4~~1.20

a In cases where both a general building area type and a specific building area type are listed, the specific building area type shall apply.

~~TABLE C405.5.2(2)~~
~~INTERIOR LIGHTING POWER ALLOWANCES:~~
~~SPACE-BY-SPACE METHOD~~

~~COMMON SPACE-BY-SPACE TYPES~~	~~LPD (w/ft^2)~~
~~Atrium – First 40 feet in height~~	~~0.03 per ft. ht.~~
~~Atrium – Above 40 feet in height~~	~~0.02 per ft. ht.~~
~~Audience/seating area – permanent~~ ~~For auditorium~~ ~~For performing arts theater~~ ~~For motion picture theater~~ ~~Classroom/lecture/training~~ ~~Conference/meeting/multipurpose~~ ~~Corridor/transition~~	 ~~0.9~~ ~~2.6~~ ~~1.2~~ ~~1.30~~ ~~1.2~~ ~~0.7~~
~~Dining area~~ ~~Bar/lounge/leisure dining~~ ~~Family dining area~~	 ~~1.40~~ ~~1.40~~
~~Dressing/fitting room performing arts theater~~	~~1.1~~
~~Electrical/mechanical~~	~~1.10~~
~~Food preparation~~	~~1.20~~
~~Laboratory for classrooms~~	~~1.3~~
~~Laboratory for medical/industrial/research~~	~~1.8~~
~~Lobby~~	~~1.10~~
~~Lobby for performing arts theater~~	~~3.3~~
~~Lobby for motion picture theater~~	~~1.0~~
~~Locker room~~	~~0.80~~
~~Lounge recreation~~	~~0.8~~
~~Office – enclosed~~	~~1.1~~
~~Office – open plan~~	~~1.0~~

~~COMMON SPACE-BY-SPACE TYPES~~	~~LPD (w/ft^2)~~
~~Restroom~~	~~1.0~~
~~Sales area~~	~~1.6[a]~~
~~Stairway~~	~~0.70~~
~~Storage~~	~~0.8~~
~~Workshop~~	~~1.60~~
~~Courthouse/police station/penetentiary~~ ~~- Courtroom~~ ~~- Confinement cells~~ ~~- Judge chambers~~ ~~- Penitentiary audience seating~~ ~~- Penitentiary classroom~~ ~~- Penitentiary dining~~	 ~~1.90~~ ~~1.1~~ ~~1.30~~ ~~0.5~~ ~~1.3~~ ~~1.1~~
~~BUILDING SPECIFIC SPACE-BY-SPACE TYPES~~	
~~Automotive - service/repair~~	~~0.70~~
~~Bank/office - banking activity area~~	~~1.5~~
~~Dormitory living quarters~~	~~1.10~~
~~Gymnasium/fitness center~~ ~~- Fitness area~~ ~~- Gymnasium audience/seating~~ ~~- Playing area~~	 ~~0.9~~ ~~0.40~~ ~~1.40~~
~~Healthcare clinic/hospital~~ ~~- Corridors/transition~~ ~~- Exam/treatment~~ ~~- Emergency~~ ~~- Public and staff lounge~~ ~~- Medical supplies~~ ~~- Nursery~~ ~~- Nurse station~~ ~~- Physical therapy~~ ~~- Patient room~~ ~~- Pharmacy~~ ~~- Radiology/imaging~~ ~~- Operating room~~ ~~- Recovery~~ ~~- Lounge/recreation~~ ~~- Laundry - washing~~	 ~~1.00~~ ~~1.70~~ ~~2.70~~ ~~0.80~~ ~~1.40~~ ~~0.9~~ ~~1.00~~ ~~0.90~~ ~~0.70~~ ~~1.20~~ ~~1.3~~ ~~2.20~~ ~~1.2~~ ~~0.8~~ ~~0.60~~
~~Hotel~~ ~~- Dining area~~ ~~- Guest rooms~~ ~~- Hotel lobby~~ ~~- Highway lodging dining~~ ~~- Highway lodging guest rooms~~	 ~~1.30~~ ~~1.10~~ ~~2.10~~ ~~1.20~~ ~~1.10~~
~~Library~~ ~~- Stacks~~ ~~- Card file and cataloguing~~ ~~- Reading area~~	 ~~1.70~~ ~~1.10~~ ~~1.20~~

~~COMMON SPACE-BY-SPACE TYPES~~	~~LPD (w/ft^2)~~
~~Manufacturing~~	
~~— Corridors/transition~~	~~0.40~~
~~— Detailed manufacturing~~	~~1.3~~
~~— Equipment room~~	~~1.0~~
~~— Extra high bay (> 50-foot floor-ceiling height)~~	~~1.1~~
~~— High bay (25 — 50-foot floor-ceiling height)~~	~~1.20~~
~~— Low bay (< 25-foot floor-ceiling height)~~	~~1.2~~
~~Museum~~	
~~— General exhibition~~	~~1.00~~
~~— Restoration~~	~~1.70~~
~~Parking garage — garage areas~~	~~0.2~~
~~Convention center~~	
~~— Exhibit space~~	~~1.50~~
~~— Audience/seating area~~	~~0.90~~
~~Fire stations~~	
~~— Engine room~~	~~0.80~~
~~— Sleeping quarters~~	~~0.30~~
~~Post office~~	
~~— Sorting area~~	~~0.9~~
~~Religious building~~	
~~— Fellowship hall~~	~~0.60~~
~~— Audience seating~~	~~2.40~~
~~— Worship pulpit/choir~~	~~2.40~~
~~Retail~~	
~~— Dressing/fitting area~~	~~0.9~~
~~— Mall concourse~~	~~1.6~~
~~— Sales area~~	~~1.6[a]~~
~~Sports arena~~	
~~— Audience seating~~	~~0.4~~
~~— Court sports area — Class 4~~	~~0.7~~
~~— Court sports area — Class 3~~	~~1.2~~
~~— Court sports area – Class 2~~	~~1.9~~
~~— Court sports area — Class 1~~	~~3.0~~
~~— Ring sports area~~	~~2.7~~
~~Transportation~~	
~~— Air/train/bus baggage area~~	~~1.00~~
~~— Airport concourse~~	~~0.60~~
~~— Terminal – ticket counter~~	~~1.50~~
~~Warehouse~~	
~~— Fine material storage~~	~~1.40~~
~~— Medium/bulky material~~	~~0.60~~

~~For SI: 1 foot = 304.8 mm, 1 watt per square foot = 11 W/m^2.~~

~~a. Where lighting equipment is specified to be installed to highlight specific merchandise in addition to lighting equipment specified for general lighting and is switched or dimmed on circuits different from the circuits for general lighting, the smaller of the actual wattage of the lighting equipment installed specifically for merchandise, or additional lighting power as determined below shall be added to the interior lighting power determined in accordance with this line item.~~

~~Calculate the additional lighting power as follows:~~

~~Additional Interior Lighting Power Allowance = 500 watts + (Retail Area 1 × 0.6 W/ft^2) + (Retail Area 2 × 0.6 W/ft^2) + (Retail Area 3 × 1.4 W/ft^2) + (Retail Area 4 × 2.5 W/ft^2).~~

~~where:~~

~~Retail Area 1 =The floor area for all products not listed in Retail Area 2, 3 or 4.~~
~~Retail Area 2 =The floor area used for the sale of vehicles, sporting goods and small electronics.~~

~~Retail Area 3 =The floor area used for the sale of furniture, clothing, cosmetics and artwork.~~
~~Retail Area 4 =The floor area used for the sale of jewelry, crystal and china.~~

~~**Exception:** Other merchandise categories are permitted to be included in Retail Areas 2 through 4 above, provided that justification documenting the need for additional lighting power based on visual inspection, contrast, or other critical display is *approved* by the authority having jurisdiction.~~

Table C405.5.2(2)
Lighting Power Density Allowances Using the Space-by-Space Method

Common Space Types[1]	LPD watts/sq.ft	RCR Threshold
Audience Seating Area		
... in an auditorium	0.63	6
... in a convention center	0.82	4
... in a gymnasium	0.65	6
... in a motion picture theater	1.14	4
... in a penitentiary	0.28	4
... in a performing arts theater	2.43	8
... in a religious building	1.53	4
... in a sports arena	0.43	4
... otherwise	0.43	4
Atrium		
... that is ≤ 40' in height	0.03 per foot in total height	NA
... that is > 40' in height	0.40 + 0.02 per foot in total height	NA
Banking Activity Area	1.01	6
Breakroom (See Lounge/Breakroom)		
Classroom/Lecture Hall/Training Room		
... in a penitentiary	1.34	4
... otherwise	1.24	4
Conference/Meeting/Multipurpose Room	1.23	6
Confinement Cells	0.81	6
Copy/Print Room	0.72	6
Corridor[2]		
... in an Assisted Living Facility (and used primarily by residents)[3]	0.92	Width < 8'
... in a hospital	0.79	Width < 8'
... in a manufacturing facility	0.41	Width < 8'
... otherwise	0.66	Width < 8'
Courtroom	1.72	6
Computer Room	1.71	4
Dining Area		
... in a penitentiary	0.96	6
... in an Assisted Living Facility (and used primarily by residents)[3]	1.90	4
... in Bar/Lounge or Leisure Dining	1.07	4
... in Cafeteria or Fast Food Dining	0.65	4
... in Family Dining	0.89	4
... otherwise	0.65	4
Electrical/Mechanical Room	0.42	6
Emergency Vehicle Garage	0.56	4
Food Preparation Area	1.21	6
Guest Room	0.47	6
Laboratory		

… in or as a classroom	1.43	6
… otherwise	1.81	6
Laundry/Washing Area	0.60	4
Loading Dock, Interior	0.47	6
Lobby		
… in an Assisted Living Facility (and used primarily by residents)[3]	1.80	4
… for an elevator	0.64	6
… in a hotel	1.06	4
… in a motion picture theater	0.59	4
… in a performing arts theater	2.00	6
… otherwise	0.90	4
Locker Room	0.75	6
Lounge/Breakroom		
… in a healthcare facility	0.92	6
… otherwise	0.73	4
Office		
… enclosed	1.11	8
… open plan	0.98	4
Parking Area, Interior	0.19	4
Pharmacy Area	1.68	6
Restroom		
… in an Assisted Living Facility (and used primarily by residents)[3]	1.21	8
… otherwise	0.98	8
Sales Area[4]	1.59	6
Seating Area, General	0.54	4
Stairwell	0.69	10
Storage Room	0.63	6
Vehicular Maintenance Area	0.67	4
Workshop	1.59	6

1 - In cases where both a common space type and a building area specific space type are listed, the building area specific space type shall apply
2 - In corridors, the extra LPD allowance is permitted when the width of the corridor is less than 8' and is not based on the RCR
3 - ***An 'Assisted Living Facility' is a*** residential facility, for people with special needs or disabilities, that provides help with everyday tasks such as bathing, dressing, and taking medication.
4 - For accent lighting, see Section 9.6.2(b)

Building Type Specific Space Types	**LPD watts/sq.ft**	**RCR Threshold**
Assisted Living Facility[3]		
… in a chapel (used primarily by residents)	2.21	4
… in a recreation room (used primarily by residents)	2.41	6
Automotive (See Vehicular Maintenance Area above)		
Convention Center - Exhibit Space	1.45	4
Dormitory - Living Quarters	0.38	8
Fire Station - Sleeping Quarters	~~0.25~~ 0.22	6
Gymnasium/Fitness Center		
… in an Exercise Area	0.72	4
… in a Playing Area	1.20	4
Healthcare Facility		
… in an Exam/Treatment Room	1.66	8
… in an Imaging Room	1.51	6
… in a Medical Supply Room	0.74	6
… in a Nursery	0.88	6

… in a Nurse's Station	0.71	6
… in an Operating Room	2.48	6
… in a Patient Room	0.62	6
… in a Physical Therapy Room	0.91	6
… in a Recovery Room	1.15	6
Library		
… in a Reading Area	1.06	4
… in the Stacks	1.71	4
Manufacturing Facility		
… in a detailed manufacturing area	1.29	4
… in an Equipment Room	0.74	6
… in an Extra High Bay Area (> 50' floor-to-ceiling height)	1.05	4
… in a High Bay Area (25-50' floor-to-ceiling height)	1.23	4
… in a Low Bay Area (< 25' floor-to-ceiling height)	1.19	4
Museum		
… in a General Exhibition Area	1.05	6
… in a Restoration Room	1.02	6
Performing Arts Theater - Dressing Room	0.61	6
Post Office - Sorting Area	0.94	4
Religious Buildings		
… in a Fellowship Hall	0.64	4
… in a Worship/Pulpit/Choir Area	1.53	4
Retail Facilities		
… in a Dressing/Fitting Room	0.71	8
… in a Mall Concourse	1.10	4
Sports Arena - Playing Area		
… for a Class I facility	3.68	4
… for a Class II facility	2.40	4
… for a Class III facility	1.80	4
… for a Class IV facility	1.20	4
Transportation Facility		
… in a baggage/carousel Area	0.53	4
… in an Airport Concourse	0.36	4
… at a Terminal Ticket Counter	0.80	4
Warehouse - Storage Area		
…for medium to bulky, palletized items	0.58	4
… for smaller, hand-carried items[5]	0.95	6
5 - sometimes referred to as a 'Picking Area'.		

Reason: *This proposal modifies the Space-by-space lighting power density (LPD) table:*

1. *LPDs have been adjusted to account for changes to recommended light levels as published in the new, 10th Edition of the IES Lighting Handbook. Some values have gone up while others have gone down. As an average, the changed LPDs dropped 6%.*
2. *Three new space types have been added in response to user requests: (i) Copy/Print Rooms, (ii) Loading Docks, Interior and (iii) Computer rooms.*
3. *Also in response to user requests, new space types for Assisted Living Facilities were added including corridor, dining area, lobby, restroom, chapel and recreation room. In all cases these modified LPDs are restricted to those spaces that are used primarily by the residents.*
4. *Some space types were renamed for consistency.*
5. *Some table footnotes were added to provide more specific direction.*

Cost Impact: The code change proposal will increase the cost of construction.

CE337–13

C202 (NEW), C406.1, C406.2, Table C406.2(1), Table C406.2(2), Table C406.2(3), Table C406.2(4), Table C406.2(5), Table C406.2(6), Table C406.2(7), C406.3, C406.4, C406.5 (NEW), C406.6 (NEW), C406.8 (NEW), C406.8.1 (NEW)

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (eric@brittmakela.com), Jim Edelson, New Buildings Institute

Revise as follows:

C406.1 Requirements. Buildings shall comply with at least one of the following:

1. More efficient HVAC equipment ~~performance~~ in accordance with Section C406.2.
2. Reduced ~~efficient~~ lighting power density system in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High efficiency service water heating in accordance with Section C406.8.

C406.2. More efficient HVAC equipment performance. Equipment shall exceed the minimum efficiency requirements listed in Tables C403.2.3(1) through 403.2.3(7) by 10 percent in addition to the requirements of Section C403. Where multiple performance requirements are provided, the equipment shall exceed all requirements by 10 percent. *Variable refrigerant flow systems* shall exceed the energy efficiency provisions of ANSI/ASHRAE/IES 90.1 by 10 percent. Equipment not listed in Tables C403.2.3(1) through 403.2.3(7) shall be limited to 10 percent of the total building system capacity.

~~**TABLE C406.2(1)**~~
~~**UNITARY AIR CONDITIONERS AND CONDENSING UNITS, ELECTRICALLY OPERATED, EFFICIENCY REQUIREMENTS**~~

~~EQUIPMENT TYPE~~	~~SIZE CATEGORY~~	~~SUBCATEGORY OR RATING CONDITION~~	~~MINIMUM EFFICIENCY[a]~~	
			~~CLIMATE ZONES 1 - 5~~	~~CLIMATE ZONES 6 - 8~~
~~Air conditioners, air cooled~~	~~< 65,000 Btu/h~~	~~Split system~~	~~15.0 SEER 12.5 EER~~	~~14 SEER 12 EER~~
		~~Single package~~	~~15.0 SEER 12.0 EER~~	~~14.0 SEER 11.6 EER~~
	~~≥ 65,000 Btuh/h and < 240,000 Btu/h~~	~~Split system and single package~~	~~12.0 EER[b] 12.54 IEER[b]~~	~~11.5 EER[b] 12.0 IEER[b]~~
	~~≥ 240,000 Btu/h and < 760,000 Btu/h~~	~~Split system and single package~~	~~10.8 EER[b] 11.3 IEER[b]~~	~~10.5 EER[b] 11.0 IEER[b]~~
	~~≥ 760,000 Btu/h~~	~~—~~	~~10.2 EER[b] 10.7 IEER[b]~~	~~9.7 EER[b] 10.2 IEER[b]~~
~~Air conditioners, water and evaporatively cooled~~	~~—~~	~~Split system and single package~~	~~14.0 EER~~	~~14.0 EER~~

~~For SI: 1 British thermal unit per hour = 0.2931 W.~~
~~a. IEERs are only applicable to equipment with capacity modulation.~~
~~b. Deduct 0.2 from the required EERs and IPLVs for units with a heating section other than electric resistance heat.~~

TABLE C406.2(2)
UNITARY AND APPLIED HEAT PUMPS, ELECTRICALLY OPERATED, EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	SIZE CATEGORY	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY[a]	
			CLIMATE ZONES 1 - 5	CLIMATE ZONES 6 - 8
Air cooled (Cooling mode)	< 65,000 Btu/h	Split system	15.0 SEER, 12.5 EER	14.0 SEER, 12.0 EER
		Single package	15.0 SEER, 12.0 EER	14.0 SEER 11.6 EER
	≥ 65,000 Btu/h and < 240,000 Btu/h	Split system and single package	12.0 SEER, 12.4 EER	11.5 EER[b], 12.0 IEER[b]
	≥ 240,000 Btu/h	Split system and single package	12.0 SEER, 12.4 EER	10.5 EER[b], 10.5 IEER[b]
Water sources (Cooling mode)	< 135,000 Btu/h	85°F entering water	14.0 EER	14.0 EER
Air cooled (Heating mode)	< 65,000 Btu/h (Cooling capacity)	Split system	9.0 HSPF	8.5 HSPF
		Single package	8.5 HSPF	8.0 HSPF
	≥ 65,000 Btu/h and < 135,000 Btu/h (Cooling capacity)	47°F db/43°F wb outdoor air	3.4 COP	3.4 COP
		17°F db/15°F wb outdoor air	2.4 COP	2.4 COP
	≥ 135,000 Btu/h (Cooling capacity)	47°F db/43°F wb outdoor air	3.2 COP	3.2 COP
		77°F db/15°F wb outdoor air	2.1 COP	2.1 COP
Water sources (Heating mode)	< 135,000 Btu/h (Cooling capacity)	70°F entering water	4.6 COP	4.6 COP

For SI: °C = [(°F) - 32] / 1.8, 1 British thermal unit per hour = 0.2931 W.
db = dry-bulb temperature, °F; wb = wet-bulb temperature, °F.
a. IEERs and Part load rating conditions are only applicable to equipment with capacity modulation.
b. Deduct 0.2 from the required EERs and IPLVs for units with a heating section other than electric resistance heat.

TABLE C406.2(3)
PACKAGED TERMINAL AIR CONDITIONERS AND PACKAGED TERMINALHEAT PUMPS

EQUIPMENT TYPE	SIZE CATEGORY	MINIMUM EFFICIENCY
Air conditioners and heat pumps (cooling mode)	< 7,000 Btu/h	11.9 EER
	7,000 Btu/h and < 10,000 Btu/h	11.3 EER
	10,000 Btu/h and ≤ 13,000 Btu/h	10.7 EER
	> 13,000 Btu/h	9.5 EER

TABLE C406.2(4)
WARM AIR FURNACES AND COMBINATION WARM AIR FURNACES/AIR-CONDITIONING UNITS, WARM AIR DUCT FURNACES AND UNIT HEATERS, EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	SIZE CATEGORY (INPUT)	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE
Warm air furnaces, gas fired[a]	< 225,000 Btu/h	—	For Climate Zones 1 and 2 NR	DOE 10 CFR Part 430 or ANSI Z21.47
			For Climate Zones 3 and 4 90 AFUE or 90 E_t[c]	
			For Climate Zones 4—8 92 AFUE or 92 E_t[c]	
	≥ 225,000 Btu/h	Maximum capacity	90% E_c[b]	ANSI Z21.47
Warm air furnaces, oil fired[a]	< 225,000 Btu/h	—	For Climate Zones 1 and 2 NR	DOE 10 CFR Part 430 or UL 727
			For Climate Zones 3—8 85 AFUE or 85 E_t[c]	
	≥ 225,000 Btu/h	Maximum capacity	85% E_t[b]	UL 727
Warm air duct furnaces, gas fired[a]	All capacities	Maximum capacity	90% E_c	ANSI Z83.8
Warm air unit heaters, gas fired	All capacities	Maximum capacity	90% E_c	ANSI Z83.8
Warm air unit heaters, oil fired	All capacities	Maximum capacity	90% E_c	UL 731

For SI: 1 British thermal unit per hour = 0.2931 W.

E_t = Thermal efficiency. E_c = Combustion efficiency (100 percent less flue losses).

a. Efficient furnace fan: Fossil fuel furnaces in climate zones 3 to 8 shall have a furnace electricity ratio not greater than 2 percent and shall include a manufacturer's designation of the furnace electricity ratio.

b. Units shall also include an IID (intermittent ignition device), have jacket losses not exceeding 0.75 percent of the input rating, and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for those furnaces where combustion air is drawn from the conditioned space.

c. Where there are two ratings for units not covered by NAECA (3 phase power or cooling capacity greater than or equal to 65,000 Btu/h [19 kW]), units shall be permitted to comply with either rating.

TABLE C406.2(5)
BOILER, EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	FUEL	SIZE CATEGORY	TEST PROCEEDURE	MINIMUM EFFICIENCY
Steam	Gas	< 300,000 Btu/h	DOE 10 CFR Part 430	83% AFUE
		> 300,000 Btu / h and < 2.5 m Btu/h	DOE 10 CFR Part 431	81% E_t
		>2.5 m Btu/h		82% E_c
	Oil	< 300,000 Btu/h	DOE 10 CFR Part 430	85% AFUE
		> 300,000 Btu/h and < 2.5 m Btu/h	DOE 10 CFR Part 431	83% E_t
		>2.5 m Btu/h		84% E_c
Hot water	Gas	< 300,000 Btu/h	DOE 10 CFR Part 430	97% AFUE
		> 300,000 Btu/h and < 2.5 m Btu/h	DOE 10 CFR Part 431	97% E_t
		>2.5 m Btu/h		94% E_c

	~~Oil~~	~~< 300,000 Btu/h~~	~~DOE 10 CFR Part 430~~	~~90% AFUE~~
		~~> 300,000 Btu/h and < 2.5 m Btu/h~~	~~DOE 10 CFR Part 431~~	~~88% E_t~~
		~~>2.5 m Btu/h~~		~~87% E_c~~

~~For SI: 1 British thermal unit per hour = 0.2931 W.~~

~~E_t = Thermal efficiency. E_c = Combustion efficiency (100 percent less flue losses).~~

TABLE C406.2(6)
CHILLERS—EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	SIZE CATEGORY	UNITS	MINIMUM EFFICIENCY[a] (I-P)				Test Procedure[b]
			Path A		Path B[c]		
			Full Load	IPLV	Full Load	IPLV	
Air cooled chillers with condenser, electrically operated	< 150 tons	EER	10.000	12.500	NA	NA	AHRI 550/590[f]
	≥ 150 tons	EER	10.000	12.750	NA	NA	
Air cooled without condenser, electrical operated	All capacities	EER	Condenserless units shall be rated with matched condensers				AHRI 550/590[f]
Water cooled, electrically operated, positive displacement (reciprocating)	All capacities	kw/ton	Reciprocating units required to comply with water cooled positive displacement requirements				AHRI 550/590[f]
Water-cooled electrically operated, positive displacement	< 75 tons	kw/ton	0.780	0.630	0.800	0.600	AHRI 550/590[f]
	≥ 75 tons and < 150 tons	kw/ton	0.775	0.615	0.790	0.586	
	≥ 150 tons and < 300 tons	kw/ton	0.680	0.580	0.718	0.540	
	≥ 300 tons	kw/ton	0.620	0.540	0.639	0.490	
Water cooled electrically operated, centrifugal[d]	< 150 tons	kw/ton	0.634	0.596	0.639	0.450	AHRI 550/590[f]
	≥ 150 tons and < 300 tons	kw/ton	0.634	0.596	0.639	0.450	
	≥ 300 tons and < 600 tons	kw/ton	0.576	0.549	0.600	0.400	
	≥ 600 tons	kw/ton	0.570	0.539	0.590	0.400	
Air-cooled absorption single effect[e]	All capacities	COP	0.600	NR	NA	NA	AHRI 560
Water cooled absorption single effect[e]	All capacities	COP	0.700	NR	NA	NA	
Absorption double effect indirect-fired	All capacities	COP	1.000	1.050	NA	NA	
Absorption double effect direct fired	All capacities	COP	1.000	1.000	NA	NA	

For SI: 1 Ton = 3516 W.

NA = Not applicable and cannot be used for compliance. NR = No minimum requirements.

a. Compliance with this standard can be obtained by meeting the minimum requirements of Path A or Path B. However both the full load and IPLV shall be met to fulfill the requirements of Path A and Path B.

b. Chapter 6 of the referenced standard contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

c. Path B is intended for applications with significant operating time at part load. All Path B machines shall be equipped with demand limiting capable controls.

d. The chiller equipment requirements do not apply for chillers used in low temperature applications where the design leaving fluid temperature is greater than 40°F.

e. Only allowed to be used in heat recovery applications.

f. Packages that are not designed for operation at ARI Standard 550/590 test conditions (and, thus, cannot be tested to meet the requirements of Table C-3) of 44°F leaving chilled water temperature and 85°F entering condenser water temperature with 3 gpm/ton condenser water flow shall have maximum full load kW/ton and *NPLV* ratings adjusted using the following equation:

Adjusted maximum full load kW/ton rating = (full load kW/ton from Table C-3)/K_{adj}

Adjusted maximum NPLV rating = (IPLV from Table C-3)/K_{adj}

~~where:~~

~~K_{adj} = 6.174722 – 0.303668(X) + 0.00629466(X)^2 – 0.000045780(X)^3~~

~~X = DT_{std} + LIFT (°F)~~

~~DT_{std} = [(24 + (full load kW/ton from Table C-3) × 6.83)]/flow (°F)~~

~~Flow = condenser water flow (gpm) / cooling full load capacity (tons)~~

~~LIFT = CEWT – CLWT (°F)~~

~~CEWT = full load entering condenser water temperature (°F)~~

~~CLWT = full load leaving chilled water temperature (°F)~~

~~The adjusted full load and *NPLV* values are only applicable over the following full load design ranges:~~

~~Minimum leaving chilled water temperature: 38°F~~

~~Maximum condenser entering water temperature: 102°F~~

~~Condenser water flow: 1 to 6 gpm/ton~~

~~X ≥ 39°F and ≤60°F~~

~~**TABLE C406.2(7)**~~
~~**ABSORPTION CHILLERS—EFFICIENCY REQUIREMENTS**~~

~~EQUIPMENT TYPE~~	~~MINIMUM EFFICIENCY FULL LOAD COP (IPLV)~~
~~Air cooled, single effect~~	~~0.60, allowed only in heat recovery applications~~
~~Water cooled, single effect~~	~~0.70, allowed only in heat recovery applications~~
~~Double effect – direct fired~~	~~1.0 (1.05)~~
~~Double effect – indirect fired~~	~~1.20~~

C406.3 Reduced lighting power density The total interior lighting power (watts) of the building shall be determined by using 90 percent of the lighting power values in Table C405.5.2(1)~~the reduced whole building interior lighting power in Table C406.3~~ times the floor area of the building types~~.~~ or by using 90 percent of the interior lighting power allowance calculated by the Space by Space method in section C405.5.2.

C406.4 Enhanced digital lighting controls. Interior lighting in the building shall have the following enhanced lighting controls which shall be located, scheduled, and operated in accordance with Section C405.2.2.

1. Luminaires shall be capable of continuous dimming.
2. Luminaires shall be capable of being addressed individually. Where individual addressability is not available for the luminaire class type, a controlled group of no more than 4 luminaries shall be allowed.
3. No more than 8 luminaires shall be controlled together in a *daylight zone*
4. Fixtures shall be controlled through a digital control system that includes the following function:
   - 1.1. Control reconfiguration based on digital addressability
   - 1.2. Load shedding
   - 1.3. Individual user control of overhead general illumination in open offices
   - 1.4. Occupancy sensors shall be capable of being reconfigured through the digital control system.
5. Construction documents shall include submittal of a Sequence of Operations, including a specification outlining each of the functions in Item 4 of Section C406.4.
6. Functional testing of lighting controls shall comply with Section 408.

~~**C406.4**~~ **C406.5 On-site renewable energy** Total minimum ratings of on-site renewable energy systems shall comply with one of the following:

1. Provide not less than 1.75 btu's, or not less than 0.50 watts, per square foot of conditioned floor area.

2. Provide not less than 3 percent of the energy used within the building for building mechanical and service water heating equipment and lighting regulated in Chapter 4;

C406.6 Dedicated outdoor air system. Buildings covered by Section C403.4 shall be equipped with an independent ventilation system designed to provide no less than the minimum 100 percent outdoor air to each individual occupied space as specified by the *International Mechanical Code*, to each individual occupied space. The ventilation system shall be capable of total energy recovery. The HVAC system shall include supply-air temperature controls that automatically reset the supply-air temperature in response to representative building loads, or to outdoor air temperatures. The controls shall reset the supply air temperature at least 25 percent of the difference between the design supply-air temperature and the design room air temperature.

C406.7 Reduced energy use in service water heating. Buildings shall be of the following types to use this compliance method:

1. Group R-1, Boarding houses, Hotels or motels;
2. Group I-2, Hospitals, mental hospitals, and nursing homes;
3. Group A-2, Restaurants and Banquet halls or buildings containing food preparation areas;
4. Group F, Laundries;
5. Group R-2 Buildings with residential occupancies;
6. Group A-3 Health clubs and spas; or
7. Buildings showing a service hot water load of 10 percent or more of total building energy loads as shown with an energy analysis as described in Section C407.

C406.7.1 Load fraction. The building service water heating system shall have one or more of the following that are sized to provide at least 60 percent of hot water requirements, or sized to provide 100 percent of hot water requirements if the building must otherwise comply with Section C403.4.6:

1. Waste heat recovery from service hot water, heat recovery chillers, building equipment, process equipment, or a combined heat and power system.
2. Solar water heating systems.

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

VARIABLE REFRIGERANT FLOW SYSTEM. An engineered direct expansion (DX) refrigerant system that incorporates a common condensing unit, at least one variable capacity compressor, a distributed refrigerant piping network to multiple indoor fan heating and cooling units each capable of individual zone temperature control, through integral zone temperature control devices and common communications network. Variable refrigerant flow utilizes three or more steps of control on common inter-connecting piping.

Reason: This proposal increases the number of optional packages in the IECC from three to six for compliance with Section C406, in addition to the modeling options available both in Section 507 of the IECC and the Energy Cost Budget method of ASHRAE 90.1. The purpose of this section is to provide flexibility for compliance, and to recognize that all buildings may not be able to meet higher levels of efficiency in today's prescriptive model codes without providing options. The specifications included in the six approximately equal energy packages were based on preliminary modeling done by New Buildings Institute.

HVAC

The equipment tables have been removed and replaced with a requirement for a 10% increase in efficiency over the base requirements. This will ensure that the HVAC equipment efficiency levels contained in this section provide the necessary energy savings over equipment efficiencies contained in Section C403. This will allow the base efficiencies to be increased in future code cycles without needing to make corresponding changes to Section C406. The proposed option limits the use of heating and cooling equipment not listed in the C403 tables to no more than 10% of the total building capacity. This would allow some systems, e.g. electric resistance heat, to be used in a limited capacity for the proposed project and still allow the code user to use this option. Under the 2012 IECC all systems must comply with the equipment efficiency requirements.

LPD

The LPD tables have been removed and replaced with a requirement for a 10% increase in efficiency over the base requirements for whole building or space-by-space. This will ensure that the LPD levels contained in this section provide the necessary energy

savings over the LPDs contained in Section C405. This will allow the base efficiencies to be increased in future code cycles without needing to make corresponding changes to Section C406. The 2012 IECC Additional Package Options only allowed whole building LPDs to be used. This proposal allows the use of space-by-space LPDs to provide more flexibility to the code user thereby increasing the viability of this option. The values proposed in this section are similar to those included as part of ASHRAE Standard 189.1.

The renewable option has not been modified from the 2012 IECC and provides three straightforward compliance approaches: electricity generation, thermal collection, and a calculation method for any type or combination of energy production. A path to include purchase of renewable power or credits was carefully considered, but not included based on concerns regarding verification and permanence of the transaction after the certificate of occupancy has been issued.

The Dedicated Outdoor Air System package is based on technical specifications from the 50% Technical Support Documents of the Pacific Northwest National Lab. The measure requires that adequate quantity of outside air is delivered separately to spaces in the buildings while employing 100% energy recovery. This reduces the need for excess outdoor air or supply air, and uses less energy for terminal reheating.

The Enhanced Lighting Controls Package provides a non-LPD lighting alternative package requires a digital control system to allow continuous dimming and a significant level of controllability on individual luminaires, or groups of no more than eight luminaires.

The Service Water Heating Package language is modified from similar language in the IgCC and the 2012 North Carolina commercial code. The requirements for use of waste energy to heat service hot water are in excess of what is otherwise required in Section C403 of the IECC, when applicable. Solar thermal water heating systems may also be used. This package is independent of the package offered in Section C406.5 since only one package is required for compliance with Section 406 in total.

Cost Impact: The code change proposal will not increase the cost of construction.

PM16–13
705 (New)

Proponent: Rebecca Morley, representing National Center for Healthy Housing

Add new text as follows:

SECTION 705
CARBON MONOXIDE ALARMS

705.1 General. Carbon monoxide alarms shall be installed in accordance with Section 1103.9 of the *International Fire Code* in Group R occupancies and in dwellings not regulated as Group R occupancies.

Reason: Carbon monoxide (CO) is an odorless, tasteless, invisible gas that kills more than 300 people in homes each year. Thousands more are admitted to the hospital with carbon monoxide poisoning. This is a serious issue that affects people nationwide is all regions of the country.

The International Residential Code requires CO alarms for residences with fuel-fired appliances or attached garages. This change would make the IPMC consistent with the IRC.

This proposal expands on the requirement to specifically include portable fuel burning space heaters since these devices may not be considered an appliance, since these devices may be introduced by the property owner after construction.

The following states have required CO alarms in existing residences: Alaska, California, Colorado, Illinois, Massachusetts, Michigan, Minnesota, Montana, New Jersey, New York, North Carolina, Oklahoma, Oregon, Rhode Island, Vermont and Wisconsin. Deaths from CO are spread throughout the country as residents unwittingly use dangerous methods to stay warm in unusually cold weather.

Cost Impact: Yes, this code change proposal will increase the cost of property maintenance. A carbon monoxide alarm typically costs approximately $25.

RB177–13
R320.1, R320.1.1 (New)

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@rjagroup.com)

Revise as follows:

R320.1 Scope. Where there are four or more *dwelling* units ~~*or sleeping units*~~ in a single structure, the provisions of Chapter 11 of the *International Building Code* for Group R-3 shall apply.

R320.1.1 Guest rooms. A dwelling with guestrooms shall comply with the provisions of Chapter 11 of the *International Building Code* for Group R-3. For the purpose of applying the requirements of IBC chapter 11, *guestrooms* shall be considered sleeping units.

Exception: Lodging houses.

Reason: Residential and institutional occupancies with 6 or more residents are within the scope of the IBC only and cannot be constructed under the IRC. This is based on both the scope of the IRC and IBC. Scoping provisions of the IRC and IBC, and code provisions within the IBC permit some residential and institutional occupancies with 5 or fewer occupants to be constructed in accordance with the IRC as an alternative to compliance with the IBC. The IBC occupancies that allow use of the IRC for five or fewer guests are: Group R-3 lodging houses (see G40-13), lodging houses are also in the scope of the IRC in section 101.2 #2; section 308.3.1 for Group I-1 and 308.4.1 for Group I-2.

Per the 2010 ADA Standard for Accessible Design and the IBC 1103.2.11 owner occupied lodging houses with 5 or fewer guests are not required to be accessible. So compliance with the IRC works for this condition without causing any conflicts with the IBC. If the lodging house is not owner occupied or accommodates more than 5 guests the building is outside of the scope of the IRC and accessibility is addressed since the building will be constructed per the IBC.

The issue addressed by this code change is how to handle 2012 IBC Sections 308.3.1 for I-1 and 308.4.1 for I-2. These sections classify the building as Group R-3 or allow use of the IRC for these institutional uses that have 5 or fewer care recipients. If it is classified as Group R-3 then IBC section 1107.6.3 provides requirements for accessibility of the building. Clearly the intent of Section 1107.6.3 is that if you have 4 or 5 care recipients the "sleeping units" must be Type B (subject to Section 1107.7 exceptions). The problem is that IRC structures by scope and definition do not have sleeping units:

> **R101.2 Scope.** The provisions of the *International Residential Code for One- and Two-family Dwellings* shall apply to the construction, *alteration,* movement, enlargement, replacement, repair, equipment, use and occupancy, location, removal and demolition of detached one- and two-family dwellings and townhouses not more than three stories above *grade plane* in height with a separate means of egress and their *accessory structures.*
>
> **DWELLING.** Any building that contains one or two *dwelling units* used, intended, or designed to be built, used, rented, leased, let or hired out to be occupied, or that are occupied for living purposes.

Adding the IBC definition of sleeping units to the IRC does not work because IBC sleeping units are not part of a dwelling unit. The current IBC definition of sleeping units states that "Such rooms and spaces that are also part of a dwelling unit are not sleeping units". Having a building constructed under the IRC that is not a dwelling unit, but a building with multiple sleeping units, is outside of the scope of the IRC.

Any of the Group I uses for 5 and under that are built to the IRC should have the same accessibility requirements as a Group R-3 constructed building. The IRC does not have sleeping units. Under the IRC such facilities are a dwelling unit with guest rooms. While the IRC contains a definition for guestroom, it is not clear on how the guestrooms should be counted for accessibility. Since the resident rooms are not sleeping units but guest rooms the current Section R320.1 does not require accessibility per Chapter 11 of the IBC for any IRC structures that have multiple guest rooms in one dwelling unit. The solution proposed here is to delete sleeping units from Section R320.1 to remove the confusion about the scope of sleeping units in the IRC and to add new Section R320.1.1 to address guestrooms. The statement that guestrooms shall be considered sleeping units for the purpose of applying IBC Chapter 11 is necessary because we cannot change the IBC language until the 2018 cycle. We plan to propose a more coordinated change for both the IBC and IRC to address this issue in the 2018 cycle. The exception for lodging houses is to maintain the exemption from accessibility requirements for lodging houses consistent with IBC Section 1103.2.11.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as “areas of study”. Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/CTC/Pages/default.aspx. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: None