

**Comments Provided to DPS on
Proposed Amendments to IgCC
Chapter 6**

PROPOSED AMENDMENTS TO 2012 IgCC
Chapter 6 – Energy Conservation, Efficiency and CO2e Emission Reduction
For Discussion at the DPS Public Work Session
June 11, 2014 2:00pm – 4:00pm
(Proposed by DPS)

Sec. 16. Section 604 **Automated Demand-Response Infrastructure**: Move to Appendix A.

Sec. 17. Section 607.1 **Prescriptive Compliance**: Add new first sentence: “Unless regulated by Washington Suburban Sanitary Commission (WSSC) the following shall apply.”

Sec. 18. Section 608.3 **Interior light reduction controls**, Exception 2: Delete reference to International Fire Code and replace with “Montgomery County Fire Safety Code.”

Sec. 19. Section 608.6 **Plug load controls**. Replace first sentence to read: “When installed, receptacles and electrical outlets in the following spaces shall be controlled by an occupant sensor or time switch as follows:”

Sec. 20. Section 608.6(3) change to read: “When receptacles are required, in classrooms in Group B and Group E occupancies, not less than four controlled receptacles shall be provided in each classroom.”

Sec. 21. Delete Sections 608.6.3 – 608.6.6.

Sec. 22. Section 608.10 **Verification of lamps and ballasts**. Replace with the following: Prior to the issuance of a certificate of occupancy, the field inspector must receive certification confirming the installation of luminaires, type and quantity; lamps, type, wattage and quantity, and ballasts, type and performance for each type, for consistency with the approved construction documents. Where a discrepancy is found, energy calculations shall be revised and resubmitted. Certification shall be provided by a registered design professional.

Sec. 23. Section 608.11 **Verification of lighting controls**. Replace with the following: Prior to the issuance of a certificate of occupancy, the field inspector must receive certification confirming the installation of lighting controls shown on the approved construction documents. Where a discrepancy is found, the installation shall be reviewed for conformance to the International Energy Conservation Code and Sections 608.2, 608.3, 608.4, 608.5, and 608.6. Certification shall be provided by a registered design professional.

Sec. 24. Section 609.2 **Permanent appliances and equipment**. Delete reference to International Plumbing Code and add Montgomery County Fire Safety Code.

Sec. 25. Sections 609.2.1 through 609.2.2.5: Delete in its entirety.

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Sec 26. Section 610 – **Renewable Energy Systems**: Move in its entirety to Appendix A (Project Electives).

Chapter 6 – Energy Conservation, Efficiency and CO2e Emission Reduction 601.1
Scope. The provisions of this chapter regulate the design, construction, commissioning,
and operation of buildings and their associated building sites for the effective use of
energy.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: Good practice

2011 ASHRAE 189.1 CORRELATION: 7.1

601.2 Intent. This chapter is intended to provide flexibility to permit the use of innovative
approaches and techniques to achieve the effective use of energy.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: Good practice

2011 ASHRAE 189.1 CORRELATION: None

601.3 Application. Buildings and their associated building sites shall comply with
Section 601.3.1 or Section 601.3.2.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: Good practice

2011 ASHRAE 189.1 CORRELATION: 7.2; 7.4; 7.5

601.3.1 Performance-based compliance. Buildings designed on a performance basis
shall comply with Sections 602, 608.6, 609, 610 and 611.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: Good practice

2011 ASHRAE 189.1 CORRELATION: 7.2; 7.5

601.3.2 Prescriptive-based compliance. Buildings designed on a prescriptive basis shall
comply with the requirements of Sections 605, 606, 607, 608, 609, 610 and 611.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: Good practice

2011 ASHRAE 189.1 CORRELATION: 7.2.; 7.4

601.4 Minimum requirements. Buildings shall be provided with metering complying with Section 603, and commissioning complying with Section 611. Where required in accordance with Section 604.1, building shall be provided with automated-demand response complying with Section 604.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: Good practice

2011 ASHRAE 189.1 CORRELATION:

601.5 Multiple buildings on a site and mixed use buildings. Where there is more than one building on a site and where a building has more than one use in the building, each building or each portion of a building associated with a particular use shall comply with Sections 601.5.1 or 601.5.2 or a combination of both.

601.5.1 Multiple buildings on a site. For building sites with multiple buildings, the energy use associated with the building site shall be assigned on a proportional basis to each building based on total gross floor area of each building in relation to the total gross floor area of all buildings on the building site. Where energy is derived from either renewable or waste energy, or both sources located on the building site, within individual buildings, or on individual buildings and delivered to multiple buildings, the energy so derived shall be assigned on a proportional basis to the buildings served based on building gross floor area. Energy delivered from renewable and waste energy sources located on or within a building shall be assigned to that building. Exception: Where it can be shown that energy to be used at the building site is associated with a specific building, that energy use shall be assigned to that specific building.

601.5.2 Mixed use buildings. Where buildings have more than one use, the energy use requirements shall be based on each individual occupancy

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: Good practice

2011 ASHRAE 189.1 CORRELATION: 7.3.2; 7.4.1.1

602.1 Performance-based compliance. Compliance for buildings and their sites to be designed on a performance basis shall be determined by predictive modeling. Predictive modeling shall use source energy kBtu/sf-y unit measure based on compliance with

Section 602.1.1 and CO₂e emissions in Section 602.3. Where a building has mixed uses, all uses shall be included in the performance-based compliance.

602.1.1 zEPI. Performance-based designs shall demonstrate a zEPI of not more than 51 as determined in accordance with Equation 6-1 for energy use reduction and shall demonstrate a CO₂e emissions reduction in accordance with Section 602.2 and Equation 6-2 for CO₂e. $zEPI = \frac{EUI_p}{EUI}$ (Equation 6-1) where: EUI_p the proposed energy use index in source kBtu/sf-y for the proposed design of the building and its site calculated in accordance with Section 602.1.2. EUI the base annual energy use index in source kBtu/sf-y for a baseline building and its site calculated in accordance with Section 602.1.2.

602.1.2 Base annual energy use index. The proposed energy use index (EUI_p) of the building and building site shall be calculated in accordance with Equation 6-1 and Appendix G to 2011 ASHRAE 90.1, as modified by Sections 602.1.2.1 through 602.1.2.3. The annual energy use shall include all energy used for building functions and its anticipated occupancy.

602.1.2.1 Modifications to Appendix G of 2011 ASHRAE 90.1. The performance rating in Section G1.2 of 2011 ASHRAE 90.1 shall be based on energy use converted to consistent units in accordance with Sections 602.1.2.2 and 602.1.2.3, instead of energy cost.

602.1.2.2 Electric power. In calculating the annual energy use index, electric energy used shall be consistent units by converting the electric power use at the utility meter or measured point of delivery to Btus and multiplying by the conversion factor in Table 602.1.2.1 based on the geographical location of the building.

602.1.2.3 Nonrenewable energy. In calculating the annual energy use index for fuel other than electrical power, energy use shall be converted to consistent units by multiplying the nonrenewable energy fossil fuel use at the utility meter or measured point of delivery to Btu's and multiplying by the conversion factor in Table 602.1.2.2. The conversion factor for energy sources not included in Table 602.1.2.2 shall be 1.1. Conversion factors for purchased district heating shall be 1.35 for hot water and 1.45 for steam. The conversion factor for district cooling shall be 0.33 times the value in Table 602.1.2.1 based on the EPA eGRID Sub-region in which the building is located

PROPOSED ACTION: DGS recommends DPS adopt the two following approaches which will provide opportunities for all project types: 1. Require zEPI calculations be based on the Commercial Buildings Energy Consumption Survey (CBECS) 2003 year data as baseline 2. Adopt ASHRAE 90.1 methodology where the proposed building uses the same model with improved factors for envelope, mechanical and lighting.

RATIONALE / IMPACT: zEPI methodology is fine; however no baseline data is available for entire building energy usage for any building type. Total energy building use was never recorded in 2000 which renders zEPI impractical to implement at this time based on that reference year. Until an accurate baseline can be established for zEPI to reference, zEPI will not be practical.

2011 ASHRAE 189.1 CORRELATION: 7.4; 7.5.3

602.1.3 Registered design professional in responsible charge of building energy simulation. For purposes of this section, and where it is required that documents be prepared by a registered design professional, the code official is authorized to require the owner to engage and designate on the building permit application a registered design professional who shall act as the registered design professional in responsible charge of building energy simulation. Modelers engaged by the registered design professional in responsible charge of building energy simulation shall be certified by an approved accrediting entity. Where the circumstances require, the owner shall designate a substitute registered design professional in responsible charge of building energy simulation who shall perform the duties required of the original registered design professional in responsible charge of building energy simulation. The code official shall be notified in writing by the owner whenever the registered design professional in responsible charge of building energy simulation is changed or is unable to continue to perform the duties.

PROPOSED ACTION: Adopt, however clarify the following statement: "Modelers engaged by the registered design professional in responsible charge of building energy simulation shall be certified by an approved accrediting entity."

RATIONALE / IMPACT: Poorly written; clarification to eliminate ambiguity regarding qualifications of a Modeler.

2011 ASHRAE 189.1 CORRELATION: Forward

602.2 Annual direct and indirect CO₂e emissions. The CO₂e emissions calculations for the building and building site shall be determined in accordance with Sections 602.2.1 and 602.2.2. The emissions associated with the proposed design shall be less than or equal to the CO₂e emissions associated with the standard reference design in accordance with Equation 6-2. $CO_2e_{pd} \geq (zEPI \cdot CO_2e_{srbd})/57$ (Equation 6-2) where: zEPI the minimum score in accordance with Section 602.1.1. CO₂e_{pd} emissions associated with the proposed design. CO₂e_{srbd} emissions associated with the standard reference budget design in accordance with Section 602.1.2.

602.2.1 Onsite electricity. Emissions associated with use of electric power shall be based on electric power excluding any renewable or recovered waste energy covered under Section 602.2.1. Emissions shall be calculated by converting the electric power

used by the building at the electric utility meter or measured point of delivery, to MWHs, and multiplying by the CO₂e conversion factor in Table 602.2.1 based on the EPA eGRID Sub-region in which the building is located.

602.2.2 Onsite nonrenewable energy. Emissions associated with the use of nonrenewable energy sources other than electrical power such as natural gas, fuel oil, and propane shall be calculated by multiplying the fossil fuel energy used by the building and its site at the utility meter by the national emission factors in Table 602.2.2 and the conversions required by this section. Emissions associated with fossil fuels not specified in Table 602.2.2 shall be calculated by multiplying the fossil fuel used by the building at the utility meter by 250. Emissions associated with purchased district energy shall be calculated by multiplying the energy used by the building at the utility meter by 150 for hot water and steam, and for district cooling, the factors from Table 602.2.2 based on the EPA eGRID Sub-region in which the building is located.

602.2.3 Annual direct and indirect CO₂e emissions associated with onsite use of fossil fuels and purchased district energy. Emissions associated with the use of natural gas, fuel oil and, propane shall be calculated by multiplying the natural gas, fuel oil, and propane delivered to the building at the utility meter by the corresponding emission factors in Table 602.2.2. Emissions associated with fossil fuels not listed shall be calculated by multiplying the fossil fuel delivered to the building at the utility meter by 250. Emissions associated with purchased district heating shall be calculated by multiplying the heating energy delivered to the building at the utility meter by 150 for hot water and steam, and for district cooling, the factors from Table 602.2.1 based on the EPA eGRID Sub-region in which the building is located.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: Good practice using alternative methodologies for zEPI recommended in 602.1

2011 ASHRAE 189.1 CORRELATION: 7.5.3

603.1 Purpose. Buildings that consume energy shall comply with Section 603. The purpose of this section is to provide requirements that will ensure that buildings are constructed or altered in a way that will provide the capability for their energy use, production and reclamation to be measured, monitored and reported. This includes the design of energy distribution systems so as to isolate load types, the installation of or ability to install in the future meters, devices and a data acquisition system, and the installation of, or the ability to provide, public displays and other appropriate reporting mechanisms in the future. All forms of energy delivered to the building and building site, produced on the building site or in the building and reclaimed at the building site or in the building shall be metered and all energy load types measured in accordance with this section. 603.1.1 Buildings with tenants. In buildings with tenants, the metering

required by Section 603.3 shall be collected for the entire building and for each tenant individually. Tenants shall have access to all data collected for their space.

603.2 Energy distribution design requirements and load type isolation in buildings. Energy distribution systems within, on or adjacent to and serving a building shall be designed such that each primary circuit, panel, feeder, piping system or supply mechanism supplies only one energy use type as defined in Sections 603.2.1 through 603.2.5. The energy use type served by each distribution system shall be clearly designated on the energy distribution system with the use served, and adequate space shall be provided for installation of metering equipment or other data collection devices, temporary or permanent, to measure their energy use. The energy distribution system shall be designed to facilitate the collection of data for each of the building energy use categories in Section 603.4 and for each of the end use categories listed in Sections 603.2.1 through 603.2.5. Where there are multiple buildings on a building site, each building shall comply separately with the provisions of Section 603. Exception: Buildings designed and constructed such that the total usage of each of the load types described in Sections 603.2.1 through 603.2.5 shall be permitted to be measured through the use of installed sub-meters or other equivalent methods as approved.

603.2.1 HVAC system total energy use. The HVAC system total energy use category shall include all energy used to heat, cool, and provide ventilation to the building including, but not limited to, fans, pumps, boiler energy, chiller energy and hot water.

603.2.2 Lighting system total energy use. The lighting system total energy use category shall include all interior and exterior lighting used in occupant spaces and common areas.

603.2.3 Plug loads. The plug loads energy use category shall include all energy use by devices, appliances and equipment connected to convenience receptacle outlets.

603.2.4 Process loads. The process loads energy use category shall include the energy used by any single load associated with activities within the building, such as, but not limited to, data centers, manufacturing equipment and commercial kitchens, that exceeds 5 percent of the peak connected load of the whole building.

603.2.5 Energy used for building operations loads and other miscellaneous loads. The category of energy used for building operations loads and other miscellaneous loads shall include all vertical transportation systems, automatic doors, motorized shading systems, ornamental fountains and fireplaces, swimming pools, in-ground spas, snow-melt systems, exterior lighting that is mounted on the building or used to illuminate building facades and the use of any miscellaneous loads in the building not specified in Sections 603.2.1 through 603.2.4.

603.3 Energy-type metering. Buildings shall be provided with the capability to determine energy use and peak demand as provided in this section for each of the energy types specified in Sections 603.3.1 through 603.3.7. Utility energy meters or supplemental sub-meters are permitted to be used to collect whole building data, and shall be equipped with a local data port connected to a data acquisition system in accordance with Section 603.5.

603.3.1 Gaseous fuels. Gaseous fuels including, but not limited to, natural gas, LP gas, coal gas, hydrogen, landfill gas, digester gas and biogas shall be capable of being metered at the building site to determine the gross consumption and peak demand of each different gaseous fuel by each building on a building site. The installation of gas meters and related piping shall be in accordance with the International Fuel Gas Code.

603.3.2 Liquid fuels. Liquid fuels including, but not limited, to fuel oil, petroleum-based diesel, kerosene, gasoline, bio diesel, methanol, ethanol and butane shall be capable of being metered at the building site to allow a determination of the gross consumption and peak demand of each liquid fuel use by each building on a building site. The installation of meters and related piping shall be in accordance with the International Mechanical Code.

603.3.3 Solid fuels. Solid fuels including, but not limited to, coal, charcoal, peat, wood products, grains, and municipal waste shall be capable of having their use determined at the building site to allow a determination of the gross consumption and peak demand of each solid fuel use by each building on a building site.

603.3.4 Electric power. Electric power shall be capable of being metered at the building site to allow a determination of the gross consumption and peak demand by each building on a building site. The installation of electric meters and related wiring shall be in accordance with NFPA 70.

603.3.5 District heating and cooling. Hot water, steam, chilled water, and brine shall be capable of being metered at the building site, or where produced on the building site, to allow a determination of the gross consumption of heating and cooling energy by each building on a building site. Energy use associated with the production of hot water, steam, chilled water or brine shall be determined based on the fuel used.

603.3.6 Combined heat and power. Equipment and systems with a connected load greater than 125,000 Btu/hr (36.63 kW) providing combined heat and power (CHP) shall be capable of being metered to allow a determination of the gross consumption of each form of delivered energy to the equipment. The output of CHP shall be metered in accordance with the applicable portions of Section 603 based on the forms of output from the CHP.

603.3.7 Renewable and waste energy. Equipment and systems providing energy from renewable or waste energy sources which is included in the determination of the building zEPI, shall be capable of being metered to allow a determination of the output of equipment and systems in accordance with Sections 603.3.7.1 through 603.3.7.5.

603.3.7.1 Solar electric. Equipment and systems providing electric power through conversion of solar energy directly to electric power shall be capable of being metered so that the peak electric power (kW) provided to the building and its systems or to off-site entities can be determined at 15-minute intervals and the amount of electric power (kWh) provided to the building and its systems can be determined at intervals of 1 hour or less.

603.3.7.2 Solar thermal. Equipment and systems providing heat to fluids or gases through the capture of solar energy shall be capable of being metered so that the peak thermal energy (Btu/h) provided to the building and its systems or to off-site entities can be determined at 15-minute intervals and the amount of heat captured (Btu) for delivery to the building and its systems can be determined intervals of 1 hour or less. Exception: Systems with a rated output of less than 100 kBtu/hr shall not be required to have the capacity to be metered.

603.3.7.3 Waste heat. Equipment and systems providing energy through the capture of waste heat shall be capable of being metered so that the amount of heat captured and delivered to the building and its systems can be determined at intervals of 1 hour or less. Exception: Systems with a rated output of less than 100 kBtu/hr shall not be required to have the capacity to be metered.

603.3.7.4 Wind power systems. Equipment and systems providing electric power through conversion of wind energy directly to electric power shall be capable of being metered so that the peak electric power (kW) provided to the building and its systems or to off-site entities can be determined at 15-minute intervals and the amount of electric power (kWh) provided to the building and its systems can be determined at intervals of 1 hour or less.

603.3.7.5 Other renewable energy electric production systems. Equipment and systems providing electric power through conversion of other forms of renewable energy directly to electric power shall be capable of being metered so that the peak electric power (kW) provided to the building and its systems or to off-site entities can be determined at 15-minute intervals and the amount of electric power (kWh) provided to the building and its systems can be determined at intervals of 1 hour or less.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: Good practice

2011 ASHRAE 189.1 CORRELATION: Chapter 6 and 7

603.4 Energy load type sub-metering. For buildings that are not less than 25,000 square feet (2323 m² in total building floor area the energy use of the categories specified in Section 603.2 shall be metered through the use of sub-meters or other approved, equivalent methods meeting the capability requirements of Section 603.3.

PROPOSED ACTION: Adopt with following modification. Replace For buildings that are not less than 25,000 square feet with the following: For buildings that are not less than 25,000 square feet and equipped with building automation system

RATIONALE / IMPACT: Language revision for clearer intent

2011 ASHRAE 189.1 CORRELATION:

603.4.1 Buildings less than 25,000 square feet. For buildings that are less than 25,000 square feet (2323 m² in total building floor area, the energy distribution system shall be designed and constructed to accommodate the future installation of sub-meters and other approved devices in accordance with Section 603.4. This includes, but is not limited to, providing access to distribution lines and ensuring adequate space for the installation of sub-meters and other approved devices.

PROPOSED ACTION: Delete RATIONALE / IMPACT: Financially unreasonable

2011 ASHRAE 189.1 CORRELATION: 7.3.3

603.5 Minimum energy measurement and verification. Meters, sub-meters, and other approved devices installed in compliance with Sections 603.3 and 603.4 shall be connected to a data acquisition and management system capable of storing not less than 36-months worth of data collected by all meters and other approved devices and transferring the data in real time to a display as required in Section 603.6.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: Good practice; represents cost impact

2011 ASHRAE 189.1 CORRELATION:

603.5.1 Annual emissions. The data acquisition and management system shall be capable of providing the data necessary to calculate the annual CO₂e emissions associated with the operation of the building and its systems using the results of annual energy use measured in accordance with Section 603.5. The calculation shall be based on energy measured for each form of energy delivered to the site on an annual basis.

Where reporting of emissions is required, the determination of emissions shall be in accordance with Section 602.2.3.

PROPOSED ACTION: Delete

RATIONALE / IMPACT: Corresponds with 602.2 which is recommended for deletion.

2011 ASHRAE 189.1 CORRELATION:

603.6 Energy display. A permanent, readily accessible and visible display shall be provided adjacent to the main building entrance or on a publicly available Internet web site. The display shall be capable of providing all of the following: 1. The current energy demand for the whole building level measurements, updated for each fuel type at the intervals specified in Section 603.3. 2. The average and peak demands for the previous day and the same day the previous year. 3. The total energy usage for the previous 18 months.

PROPOSED ACTION: Delete

RATIONALE / IMPACT: Short term positive impact; and information is available through energy management systems

2011 ASHRAE 189.1 CORRELATION: None

604.1 Establishing an open and interoperable automated demand-response (Auto-DR) infrastructure. Where this section is indicated to be applicable in Table 302.1, buildings that contain heating, ventilating, air-conditioning (HVAC) or lighting systems shall comply with Sections 604.1 through 604.4. A building energy management and control system (EMCS) shall be provided and integrated with building HVAC systems controls and lighting systems controls to receive an open and interoperable automated demand-response (Auto-DR) relay or Internet signal. Building HVAC and lighting systems and specific building energy-using components shall incorporate preprogrammed demand response strategies that are automated with a demand response automation Internet software client. Exception: Auto-DR infrastructure is not required for the following: 1. Buildings located where the electric utility or regional Independent System Operator (ISO) or Regional Transmission Operator (RTO) does not offer a demand response program to buildings regulated by this code. 2. Buildings with a peak electric demand not greater than 0.75 times that of the standard reference design. 3. Buildings that have incorporated onsite renewable energy generation to provide 20 percent or more of the building's energy demand.

PROPOSED ACTION: Move to Appendix A (604.1 is a Jurisdictional Elective)

RATIONALE / IMPACT: Good practice, maybe difficult to implement for all projects

2011 ASHRAE 189.1 CORRELATION: 7.4.5.1

604.2 Software clients. Demand response automation software clients shall be capable of communicating with a demand response automation server via the Internet or other communication relay.

604.3 Heating, ventilating and air-conditioning (HVAC) systems. The Auto-DR strategy for HVAC systems shall be capable of reducing the building peak cooling or heating HVAC demand by not less than 10 percent when signaled from the electric utility, regional independent system operator (ISO) or regional transmission operator (RTO), through any combination of the strategies and systemic adjustments, including, but not limited to the following: 1. Space temperature set-point reset. 2. Increasing chilled water supply temperatures or decreasing hot water supply temperatures. 3. Increasing or decreasing supply air temperatures for variable air volume (VAV) systems. 4. Limiting capacity of HVAC equipment that has variable or multiple-stage capacity control. 5. Cycling of HVAC equipment or turning off noncritical equipment. 6. Disabling HVAC in unoccupied areas. 7. Limiting the capacity of chilled water, hot water, and refrigerant control valves. 8. Limiting the capacity of supply and exhaust fans, without reducing the outdoor air supply below the minimum required by Chapter 4 of the International Mechanical Code, or the minimum required by 2011 ASHRAE 62.1. 9. Limiting the capacity of chilled water or hot water supply pumps. 10. Anticipatory control strategies to pre-cool or preheat in anticipation of a peak event. Exception: The Auto-DR strategy is not required to include the following buildings and systems: 1. Hospitals and critical emergency response facilities. 2. Life safety ventilation for hazardous materials storage. 3. Building smoke exhaust systems. 4. Manufacturing process systems.

604.3.1 Rebound avoidance. The Auto-DR strategy shall include logic to prevent a rebound peak. When the signal for Auto-DR is ended, a gradual return to normal heating, ventilation and air-conditioning (HVAC) equipment operations shall be part of the Auto-DR strategy, through any combination of the strategies and systemic adjustments, including, but not limited to the following: 1. Where close to the unoccupied period, the Auto-DR period shall be extended using a rebound avoidance, extended Auto-DR control strategy until the initiation of the unoccupied period. 2. Rebound avoidance, slow recovery control strategies, gradually increasing or decreasing space temperature set-points or a variance in the timing by cooling or heating zone. 3. Rebound avoidance, slow recovery control strategies, gradually increasing or decreasing zone supply air temperatures. 4. Rebound avoidance, slow recovery control strategies, gradually increasing or decreasing chilled water temperatures or decreasing hot water temperatures. 5. Rebound avoidance, sequential equipment recovery strategies, gradually restoring demand limited equipment capacity. 6. Rebound avoidance, sequential equipment recovery strategies, gradually restoring equipment that was turned off during the Auto-DR period. 7. Rebound avoidance, slow recovery control strategies, gradually increasing capacity for air moving and pumping

systems. 8. Rebound avoidance, sequential equipment recovery or rebound avoidance, slow recovery control where chilled water or hot water and other capacity control valves are sequentially or gradually allowed to return to normal operation, respectively.

604.4 Lighting. In Group B office spaces, the Auto-DR system shall be capable of reducing total connected power of lighting as determined in accordance with Section C405.5 of the International Energy Conservation Code by not less than 15 percent. Exception: The following buildings and lighting systems need not be addressed by the Auto-DR system: 1. Buildings or portions associated with lifeline services. 2. Luminaires on emergency circuits. 3. Luminaires located in emergency and life safety areas of a building. 4. Lighting in buildings that are less than 5,000 square feet (465 m² in total area). 5. Luminaires located within a daylight zone that are dimmable and connected to automatic daylight controls complying with Section C405.2.2.3.2 of the International Energy Conservation Code. 6. Signage used for emergency, life safety or traffic control purposes.

PROPOSED ACTION: Move to Appendix A (604.1 is a Jurisdictional Elective)

RATIONALE / IMPACT: Good practice, maybe difficult to implement for all projects

2011 ASHRAE 189.1 CORRELATION: 7.4.5.1

605.1 Prescriptive compliance. Where buildings are designed using the prescriptive-based compliance path in accordance with Section 601.3.2, building thermal envelope systems shall comply with the provisions of Section C402 of the International Energy Conservation Code and the provisions of this section. 605.1.1 Insulation and fenestration criteria. The building thermal envelope shall exceed the requirements of Tables C402.1.2 and C402.3 of the International Energy Conservation Code by not less than 10 percent. Specifically, for purposes of compliance with this code, each U-factor, C-factor, F-factor and SHGC in the specified tables shall be reduced by 10 percent to determine the prescriptive criteria for this code. In Sky Type "C" locations specified in Section 808.4, the skylights shall not exceed 5 percent of the building roof area.

PROPOSED ACTION: Delete

RATIONALE / IMPACT: Redundant: covered by 2012 IECC (C502.2). More stringent requirements are financially unreasonable.

2011 ASHRAE 189.1 CORRELATION: 7.4.2

605.1.1.1 Permanent shading devices for fenestration. Vertical fenestration within 45 degrees (785 rad) of the nearest west, south, and east cardinal ordinate shall be shaded by permanent horizontal exterior projections with a projection factor greater than or equal to 0.25. Where different windows or glass doors have different projection factor

values, each shall be evaluated separately, or an area-weighted projection factor value shall be calculated and used for all windows and glass doors. Horizontal projections shall extend laterally beyond the edge of the glazing not less than one-half of the height of the glazing, except at building corners. Exception: Shading devices are not required for the following buildings and fenestrations: 1. Buildings located in hurricane-prone regions in accordance with Section 1609.2 of the International Building Code or on any other building with a mean roof height exceeding the height limits specified in Table 1504.8 of the International Building Code based on the exposure category and basic wind speed at the building site. 2. Where fenestration is located in a building wall that is within 18 inches (457 mm) of the lot line. 3. Where equivalent shading of the fenestration is provided by buildings, structures, geological formations, or permanent exterior projections that are not horizontal, as determined by sun angle studies at the peak solar altitude on the spring equinox, and three hours before and after the peak solar altitude on the spring equinox. 4. Where fenestration contains dynamic glazing that has a lower labeled solar heat gain coefficient (SHGC) equal to or less than 0.12, and the ratio of the higher and lower labeled visible transmittance (VT) is greater than or equal to 5. Dynamic glazing shall be automatically controlled to modulate, in multiple steps, the amount of solar gain and light transmitted into the space in response to daylight levels or solar intensity. Functional testing of controls shall be conducted in accordance with Section C408.3.1 of the International Energy Conservation Code.

PROPOSED ACTION: Adopt with the following modification. Add exceptions: 5. Where shade trees provided for site shading under Section 408.2.3 they may be evaluated as an offset for the need to provide permanent building mounted shading projections. 6. Where interior shading devices are provided, they may be evaluated as an offset for the need to provide permanent building mounted shading projections.

RATIONALE / IMPACT: Good practice, however trees and interior shading devices are well-established, very effective and cost effective methods of shading and energy conservation that do not have unintended negative consequences on the building envelope system, and should be included as exceptions.

2011 ASHRAE 189.1 CORRELATION: 7.4.2.5

605.1.2 Air leakage. The building thermal envelope shall be durably sealed to limit air leakage in accordance with Section C402.4 of the International Energy Conservation Code and the provisions of this section.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: Consistent with current practice

2011 ASHRAE 189.1 CORRELATION: 7.4.2.9

605.1.2.1 Air barriers. A continuous air barrier shall be provided for buildings in climate zones 1 through 8 in accordance with Section C402.4.1 of the International Energy Conservation Code. The exception in Section C402.4.1 of the International Energy Conservation Code shall not apply.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: Consistent with current practice

2011 ASHRAE 189.1 CORRELATION: 7.4.2.9

605.1.2.2 Testing requirement. The building thermal envelope air tightness shall be considered to be acceptable where the tested air leakage of the total area of the building thermal envelope is less than 0.25 cfm/ft² under a pressure differential of 0.3 in water column (1.57 lb/ft² (1.25 L/s.m² under a pressure differential of 75 Pa). Testing shall occur after rough-in and after installation of penetrations of the building envelope, including penetrations for utilities, heating, ventilating and air-conditioning (HVAC) systems, plumbing, and electrical equipment and appliances. Testing shall be done in accordance with ASTM E 779.

PROPOSED ACTION: Delete

RATIONALE / IMPACT: Impractical, financially unreasonable for some projects

2011 ASHRAE 189.1 CORRELATION: 7.4.2.9

605.1.2.3 Air curtains. Where a building entrance is required to be protected with a vestibule in accordance with the International Energy Conservation Code, an air curtain tested in accordance with ANSI/AMCA 220 is permitted to be used as an alternative to separate conditioned space from the exterior.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: Consistent with current practice

2011 ASHRAE 189.1 CORRELATION: None

605.2. Roof replacement. Above-deck insulation for roof replacement on an existing building with insulation entirely above the deck and where the roof slope is less than two units vertical in 12 units horizontal (17-percent slope) shall be in accordance with Section 1003.2.7.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: Consistent with current practice

2011 ASHRAE 189.1 CORRELATION:

606.1 Prescriptive compliance. Where buildings are designed using the prescriptive-based compliance path in accordance with Section 601.3.2, building mechanical systems shall comply with the provisions of the International Energy Conservation Code and the provisions of this section.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: No action taken

2011 ASHRAE 189.1 CORRELATION: 7.4

606.2 HVAC equipment performance requirements. Heating, ventilation and air-conditioning (HVAC) equipment shall comply with Sections 606.2.1 and 606.2.2.

606.2.1 Equipment covered by federal standards. Equipment covered by federal minimum efficiency standards shall comply with the minimum efficiency requirements of the International Energy Conservation Code. 606.2.2 Equipment not covered by federal standards. Equipment not covered by federal minimum efficiency standards shall comply with the minimum efficiency requirements of this section.

606.2.2.1 Ground source heat pumps. The efficiency of ground source heat pumps shall comply with the provisions of Table 606.2.2.1 based on the applicable referenced test procedure.

606.2.2.2 Multi-stage ground source heat pumps. The efficiency of multi-stage ground source heat pumps shall comply with the provisions of Table 606.2.2.1 based on the applicable referenced test procedure.

606.2.2.3 Minimum fan efficiency. Stand-alone supply, return and exhaust fans designed for operating with motors over 750 watts (1 hp) shall have an energy efficiency classification of not less than FEG71 as defined in AMCA 205. The total efficiency of the fan at the design point of operation shall be within 10 percentage points of either the maximum total efficiency of the fan or the static efficiency of the fan.

PROPOSED ACTION: Move to Appendix A, Adopt as written

RATIONALE / IMPACT: Good practice; may be difficult to implement for all projects

2011 ASHRAE 189.1 CORRELATION:

606.3 Duct and plenum insulation, sealing and testing. Supply and return air ducts and plenums, air handlers and filter boxes shall be insulated and sealed in accordance with Section C403.2.7.1.1 of the International Energy Conservation Code. The exception in Section C403.2.7.1.1 shall not apply:

PROPOSED ACTION: Adopt with modification: Delete "The exception in Section C403.2.7.1.1 shall not apply."

RATIONALE / IMPACT: Improving overall good practice by eliminating potential problematic situation

2011 ASHRAE 189.1 CORRELATION: 7.4.3.8

606.3.1 Duct air leakage testing. Ductwork that is designed to operate at static pressures greater than 3 inches water column (747 Pa) and all ductwork located outdoors shall be leak-tested in accordance with the SMACNA HVAC Air Duct Leakage Test Manual. Representative sections totaling not less than 25 percent of the total installed duct area for the designated pressure class shall be tested. Positive pressure testing is acceptable for negative pressure ductwork. Duct systems with pressure ratings in excess of 3 inches water column (747 Pa) shall be identified on the construction documents. Duct leakage shall not exceed the rate determined in accordance with Equation 6-3. $F C L P 0.65$ (Equation 6-3) where: F maximum leakage in cfm/100 ft² duct surface area; C L 4, duct leakage class, cfm/100 ft² at 1 inch water column. P test pressure, which shall be equal to the design duct pressure class rating inches of water column.

PROPOSED ACTION: Delete

RATIONALE / IMPACT: Incomplete and not to industry standards

2011 ASHRAE 189.1 CORRELATION: None

606.4 Heating, ventilating and air-conditioning (HVAC) piping insulation. Piping with a nominal diameter greater than 1 4 inch (6.4 mm), including associated valves, fittings and piping system components, in heating, ventilating and air-conditioning (HVAC) systems shall be thermally insulated in accordance with Table 606.4. For insulation outside of the conductivity ranges specified in Table 606.4, the minimum thickness of the insulation shall be determined in accordance with Equation 6-4. $T r [(1 t/r) K/k 1]$ (Equation 6-4) where: T minimum insulation thickness (inches). r actual outside radius of pipe (inches). t insulation thickness specified in Table 606.4 for applicable fluid temperature and pipe size. K Conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature (Btu in/h ft² °F). k the upper value of the conductivity range specified in Table 606.4 for the applicable fluid temperature. Building cavities and interstitial framing spaces shall be large enough to

accommodate the combined diameter of the pipe plus the insulation, plus the full thickness of the insulation plus any other objects in the cavity that the piping must cross. Exception: Piping insulation is not required for the following: 1. Factory-installed piping within HVAC equipment tested and rated in accordance with Section 606.2. 2. Piping conveying fluids having a design operating temperature range between 60°F (15.6°C) and 105°F (40.6°C). 3. Piping conveying fluids not heated or cooled such as roof and condensate drains, cold water supply, and natural gas piping. 4. Where heat gain or heat loss will not increase energy usage such as liquid refrigerant piping. 5. Piping having an outside diameter of 1 inch (25 mm) or less, associated with strainers, control valves, and balancing valves.

PROPOSED ACTION: Delete

RATIONALE / IMPACT: Redundant: covered by 2012 IECC

2011 ASHRAE 189.1 CORRELATION: 7.4.3

606.5 Economizers. Economizers shall comply with the requirements of the International Energy Conservation Code, except as noted herein.

606.5.1 Economizer systems. Each cooling system that has a fan shall include either an air economizer complying with Section 606.5.1.1 or a water economizer complying with Section 606.5.1.2. Exception: Economizers are not required for the following. 1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table 606.5.1(1). 2. In Group I-2 occupancies, hospitals, and Group B occupancies, ambulatory care facilities, where more than 75 percent of the air designed to be supplied by the system is to spaces that are required to be humidified above a 35°F (1.7°C) dew-point temperature to comply with applicable codes or accreditation standards. In other occupancies, where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above a 35°F (1.7°C) dew-point temperature to satisfy process needs. 3. Systems that include a condenser heat recovery system that is designed to utilize 60 percent of the peak heat rejection load at design conditions and there is a documented need for that rejected heat for either service hot water or space heating during peak heat rejection design conditions. 4. Systems that serve spaces estimated as having a sensible cooling load at design conditions, excluding transmission and infiltration loads, of less than or equal to transmission and infiltration losses at the temperature and relative humidity design conditions in accordance with Section 6.1 of 2011 ASHRAE 55. 5. Where the use of outdoor air for cooling will affect supermarket open refrigerated casework systems. 6. Where the cooling efficiency is equal to, or greater than, the efficiency improvement requirements in Table 606.5.1(2).

606.5.1.1 Air economizers. Air economizers shall be designed in accordance with Sections 606.5.1.1.1 through 606.5.1.1.4. 606.5.1.1.1 Design capacity. Air economizer

systems shall be capable of modulating outdoor air and return air dampers to provide up to 100 percent of the design supply air quantity as outdoor air for cooling.

606.5.1.1.2 Control signal. Economizer dampers shall be capable of being sequenced with the mechanical cooling equipment and shall not be controlled by only mixed air temperature. Exception: The use of mixed air temperature limit control shall be permitted for systems controlled from space temperature, such as single-zone systems.

606.5.1.1.3 High-limit shutoff. Air economizers shall be capable of automatically reducing outdoor air intake to the design minimum outdoor air quantity when the outdoor air intake will not reduce cooling energy usage. High-limit shutoff control types for specific climates shall be chosen from Table 606.5.1.1.3(1). High-limit shutoff control settings for the Table 606.5.1.1.3(1) control types shall be as specified in Table 606.5.1.1.3(2).

606.5.1.1.4 Relief of excess outdoor air. Systems shall provide a means to relieve excess outdoor air during air economizer operation to prevent over-pressurizing of the building. The relief air outlets shall be located to avoid recirculation of the relief of air into the building.

606.5.1.2 Water economizer systems for HVAC equipment. Economizer systems for heating, ventilating and air-conditioning (HVAC) equipment shall be designed in accordance with Sections 606.5.1.2.1 through 606.5.1.2.4.

606.5.1.2.1 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 (10°C) dry bulb/45°F (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 (10°C) dry bulb/45°F (7.2°C) wet bulb, shall satisfy 100 percent of the expected system cooling load at 45°F (7.2°C) dry bulb/40°F (4.4°C) wet bulb.

606.5.1.2.2 Maximum pressure drop. Pre-cooling coils and water-to-water heat exchangers used as part of a water economizer system shall have a water-side pressure drop of less than 15 feet of water column (44 835 Pa) including the control valve 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 non-economizer mode.

606.5.1.2.3 Integrated economizer control. Economizer systems shall be integrated with the mechanical cooling system and shall be capable of providing partial cooling whether or not additional mechanical cooling is required to meet the remainder of the cooling load.

606.5.1.2.4 Economizer heating system impact. Heating, ventilating and air-conditioning (HVAC) system design and economizer controls shall be so that economizer operation does not increase the building heating energy use during normal operation. Exception: Economizers on variable air volume (VAV) systems that cause zone level heating to increase because of reduction in supply air temperature.

PROPOSED ACTION: Delete

RATIONALE / IMPACT: Redundant: covered by 2012 IECC (C403.3.1)

2011 ASHRAE 189.1 CORRELATION: 7.4.3.3

606.6 Variable air volume (VAV) fan control. Individual fans with motors equal to or greater than 1.0 horsepower (0.746 kW) shall be one of the following: 1. Driven by a mechanical or electrical variable speed drive. 2. Driven by a vane-axial fan with variable-pitch blades. 3. Provided with controls or devices that will result in fan motor demand of not more than 30 percent of its 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. Static pressure sensors used to control VAV fans shall be placed in a position so that the controller set point is not greater than one-third of the total design fan static pressure, except for systems with direct digital control. Where this results in the sensor being located downstream of major duct branching, multiple sensors shall be installed in each major branch to ensure that the static pressure can be maintained in each branch. 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. The set point shall be reset lower until one zone damper is wide open. Exception: Systems without zone dampers are exempt from the static pressure reset requirements.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: Good practice

2011 ASHRAE 189.1 CORRELATION: None

606.7 Kitchen exhaust systems. Kitchen ventilation and exhaust systems shall be in accordance with the International Mechanical Code and this section. Kitchen ventilation systems that deliver conditioned supply air to any space containing a kitchen hood shall not be capable of exceeding the greater of the following: 1. The ventilation rate required to supply the space conditioning load; or 2. The hood exhaust flow minus the available transfer air from adjacent spaces. For the purposes of this section, available transfer air is considered to be that portion of outdoor ventilation air not required to satisfy other exhaust needs, such as restrooms, and not required to RETAIN pressurization of adjacent spaces. Where the total hood exhaust airflow rate of kitchen hoods in the

space is greater than 5,000 cfm (2360 L/s) each hood shall have an exhaust rate in not greater than 110 percent of the minimum exhaust rate required by the International Mechanical Code and the ventilation system shall comply with one of the following: 1. Not less than 50 percent of replacement air is transfer air that would otherwise be exhausted. 2. Demand ventilation systems that are capable of reducing exhaust and replacement air system airflow rates by not less than 50 percent for not less than 75 percent of the exhaust air. The demand ventilation system shall include controls necessary to modulate airflow in response to appliance operation and to RETAIN full capture and containment of smoke, effluent and combustion products during cooking and when idle. 3. Listed energy recovery devices with a sensible heat recovery effectiveness of not less than 40 percent shall provided for not less than 50 percent of the total exhaust air. Where a single hood, or hood section, is installed over appliances with different duty ratings, the maximum allowable flow rate for the hood or hood section shall be based on the requirements for the appliance with the highest duty rating located under the hood or hood section. Exception: Where not less than 75 percent of the replacement air provided by the kitchen ventilation and exhaust system is transfer air that would otherwise be exhausted, the provisions of this section shall not apply.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: Good practice

2011 ASHRAE 189.1 CORRELATION: 7.4.3.7

606.8 Laboratory exhaust systems. Laboratory exhaust systems shall comply with the provisions of the International Energy Conservation Code except as specified in Section 606.8.1. 606.8.1 Laboratory exhaust systems. Buildings with laboratory exhaust systems having a total exhaust rate greater than 5,000 cfm (2360 L/s) shall be provided with one or more of the following: 1. A variable air volume (VAV) laboratory exhaust and room supply system capable of reducing exhaust and makeup air flow rates to the minimum required in the International Mechanical Code. 2. A heat recovery system to precondition makeup air from laboratory exhaust so that the percentage that the exhaust and makeup air flow rates can be reduced from design conditions plus the sensible recovery effectiveness percentage totals not less than 50 percent. 3. Direct makeup auxiliary air supply equal to not less than 75 percent of the exhaust air flow rate capable of being heated and cooled to the design temperatures specified in Section C302.1 of the International Energy Conservation Code.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: Good practice

2011 ASHRAE 189.1 CORRELATION: None

606.9 Control of HVAC in Group R-1 sleeping rooms. In Group R-1 occupancies, each sleeping room shall be provided with a dedicated system to control automatically the heating, ventilating and air-conditioning (HVAC) systems to control the energy consumption during unoccupied periods. The controls shall be designed to raise cooling and lower heating temperature set points by at least 4°F (-15.6°C) during periods when the sleeping room is unoccupied. Exception: Automatic controls are not required in Group R-1 occupancies with fewer than 20 sleeping rooms.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: Good practice

2011 ASHRAE 189.1 CORRELATION: 7.4.3.9

607.1 Prescriptive compliance. Where buildings are designed using the prescriptive-based compliance path in accordance with Section 601.3.2, service water heating systems shall comply with the provisions of the International Energy Conservation Code and the provisions of this section.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: No action required

2011 ASHRAE 189.1 CORRELATION: 7.4.4

607.2 Service water heating (SWH) equipment performance requirements. Service water heating equipment shall comply with Sections 607.2.1 and 607.2.2. 607.2.1 Equipment covered by federal standards. Equipment covered by federal minimum efficiency standards shall comply with the minimum efficiency requirements of the International Energy Conservation Code. 607.2.2 Water heater controls for dwelling units. Water heaters installed in dwelling units in buildings shall be equipped with external water temperature thermostat controls. The controls shall allow the occupant to set the water temperature at a setting that is below 100°F (38°C) and greater than or equal to 50°F (10°C).

PROPOSED ACTION: Delete

RATIONALE / IMPACT: Redundant: covered by 2012 IECC

2011 ASHRAE 189.1 CORRELATION: 7.4.4

607.3 Pools, hot tubs and spas. Pools, hot tubs and spas shall comply with the efficiency requirements of the International Energy Conservation Code. 607.3.1 Pools in conditioned space. For pools that are located within the conditioned space, not less

than 25 percent of the annual energy consumption of pool operation and not less than 50 percent of the peak design space heating, ventilation, and cooling requirements for the space in which the pool is located shall be by one or both of the following: 1. An onsite renewable energy system. 2. A heat recovery system.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: Good practice

2011 ASHRAE 189.1 CORRELATION: None

607.4 Snowmelt systems. Snow melt systems shall comply with the requirements of the International Energy Conservation Code. Hydronic systems shall supplement not less than 25 percent of the design snow melting total annual consumption measured in Btu/ft² (J/m² energy per unit area. Electric systems shall supplement not less than 50 percent of the design snow melt peak load demand. These requirements shall be supplied by one or both of the following: 1. An onsite renewable energy system. 2. A heat recovery system. Exception: Emergency service ingress and egress are exempt from the requirements of Section 607.4.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: Good practice

2011 ASHRAE 189.1 CORRELATION: None

607.5 Waste water heat recovery system. The following building types shall be provided with a waste water heat recovery system that will preheat the incoming water used for hot water functions by not less than 10°F (5.6°C): 1. Group A-2, restaurants and banquet halls; 2. Group F, laundries; 3. Group R-1, boarding houses (transient), hotels (transient), motels (transient); 4. Group R-2 buildings; 5. Group A-3, health clubs and spas; and 6. Group I-2, hospitals, psychiatric hospitals and nursing homes. Exception: Waste water heat recovery systems are not required for single-story slab-on-grade and single-story on crawl-space buildings.

PROPOSED ACTION: Move to Appendix A – Adopt as written

RATIONALE / IMPACT: Financially unreasonable

2011 ASHRAE 189.1 CORRELATION: None

607.6 Service water heating piping insulation. Service water heating piping shall be thermally insulated in accordance with Table 606.4. Where hot water distribution piping is installed within attics and crawlspaces, the insulation shall continue to cover the pipe

for a distance not less than 6 inches (152 mm) beyond the building thermal envelope. Where hot water distribution piping is installed within walls, the insulation shall completely surround the pipe with not less than 1 inch (25 mm) of insulation. Where hot water piping is installed in a wall cavity of insufficient size to accommodate the pipe and insulation levels of Table 606.4, the insulation thickness shall be permitted to have the maximum thickness that the wall cavity can accommodate, but not less than 1 2 -inch (12 mm) thick. Exception: Insulation is not required for the following: 1. Factory-installed piping within service water heating equipment tested and rated in accordance with Section 606.4. 2. Piping conveying fluids that is neither heated nor cooled, including cold water supply and natural gas piping. 3. Hot water supply piping exposed under sinks, lavatories and similar fixtures. 4. Hot water distribution piping buried within blown-in or sprayed roof/ceiling insulation, such as fiberglass or cellulose, where the insulation completely and continuously surrounds the pipe. 607.6.1 Buried piping. Service hot water piping installed within a slab or below grade shall be insulated in accordance with Section 607.6 and shall be placed within a physically protective, waterproof channel or sleeve having internal dimensions large enough so that the piping and insulation can be removed and replaced, and RETAIN its dimensional integrity during and after construction. Exception: For piping other than that located under building slabs, insulation is not required where the insulation manufacturer stipulates that the pipe insulation will RETAIN its insulating value in underground applications in damp soil where installed in accordance with the manufacturer's instructions.

PROPOSED ACTION: Delete

RATIONALE / IMPACT: Redundant: covered by 2012 IECC (C404.5)

2011 ASHRAE 189.1 CORRELATION: 7.4.4.2

607.7 Circulating hot water systems. Controls that allow continuous, timer, or water temperature-initiated (aquastat) operation of a circulating pump are prohibited. Gravity or thermosyphon circulation loops are prohibited. Pumps on circulating hot water systems shall be activated on demand by either a hard-wired or wireless activation control of one of the following types: 1. A normally open, momentary contact switch. 2. Motion sensors that make momentary contact when motion is sensed. After the signal is sent, the sensor shall go into a lock out mode for not less than 5 minutes to prevent sending a signal to the electronic controls while the circulation loop is still hot. 3. A flow switch. 4. A door switch. The controls for the pump shall be electronic and operate on the principal of shutting off the pump with a rise in temperature. Electronic controls shall have a lock-out to prevent operation at temperatures greater than 105°F (41°C) in the event of failure of the device that senses temperature rise. The electronic controls shall have a lock out mode for not more than 5 minutes that prevents extended operation of the pump if the sensor fails or is damaged.

PROPOSED ACTION: Delete

RATIONALE / IMPACT: Impractical and poorly written

2011 ASHRAE 189.1 CORRELATION: None

608.1 General. Where buildings are designed using the prescriptive-based compliance path in accordance with Section 601.3.2, building electrical power and lighting systems shall comply with the provisions of the International Energy Conservation Code and the provisions of Section 608. 608.1.1 Occupant sensor controls. Occupant sensor controls shall comply with Section C405.2 of the International Energy Conservation Code. 608.1.2 Time switch controls. Time switch controls shall comply with Section C405.2 of the International Energy Conservation Code. 608.1.3 Automatic daylight controls. Automatic daylight controls shall comply with Section C405.2 of the International Energy Conservation Code.

PROPOSED ACTION: Delete

RATIONALE / IMPACT: Redundant: covered by 2012 IECC (C408.3)

2011 ASHRAE 189.1 CORRELATION: 7.4.6.2, 7.4.6.4

608.2 Sleeping unit controls. Sleeping units in Group R-1 and R-2 occupancies shall have an automatic control system or device that shuts off permanently wired luminaires and switched receptacles, except those in bathrooms, within 30 minutes of the unit being vacated. Exception: Sleeping unit controls are not required in sleeping units where permanently wired luminaires and switched receptacles, except those in bathrooms, are connected to a captive key control. 608.2.1 Sleeping unit bathroom controls. Permanently wired luminaires located in bathrooms within sleeping units in Group R-1 and R-2 occupancies shall be equipped with occupant sensors that require manual intervention to energize circuits. Exception: Not more than 5 watts of lighting in each bathroom shall be permitted to be connected to the captive key control at the main room entry instead of being connected to the occupant sensor control.

PROPOSED ACTION: Delete

RATIONALE / IMPACT: Redundant: covered by 2012 IECC

2011 ASHRAE 189.1 CORRELATION: 7.4.3.9, 7.4.6.2, 7.4.6.3, 7.4.6.4

608.3 Interior light reduction controls. Occupant sensor controls shall be provided to automatically reduce connected lighting power by not less than 45 percent during periods when occupants are not present in the following locations: 1. Corridors and enclosed stairwells; 2. Storage and stack areas not open to the public; and 3. Parking garages. Exception: Automatic power reduction is not required for the following: 1.

Where occupant sensor controls are overridden by time switch controls that keep lights on continuously during peak occupancy periods. 2. Means of egress lighting required by the International Building Code or the International Fire Code.

PROPOSED ACTION: Delete

RATIONALE / IMPACT: Redundant: covered by 2012 IECC (C405)

2011 ASHRAE 189.1 CORRELATION: 7.4.3.9, 7.4.6.1, 7.4.6.2, 7.4.6.3, 7.4.6.4

608.4 Exterior lighting controls. Exterior lighting shall comply with the requirements of Sections 608.4.1 and 608.4.2. 608.4.1 Exterior light reduction. Exterior lighting shall be controlled by a time switch and configured so that the total exterior lighting power is automatically reduced by not less than 30 percent within 2 hours after facility operations conclude. Exception: Exterior lighting need not be controlled for the following occupancies and conditions: 1. Group H occupancies. 2. Group I-3 occupancies 3. Lighting that is connected to occupant sensor controls. 4. Means of egress lighting required by the International Building Code or the International Fire Code. 5. Solar powered luminaires that are not connected to a centralized power source. 608.4.2 Exterior lighting and signage shutoff. The lighting of building facades, signage, and landscape features shall be controlled by a time switch control configured so that the lighting automatically shuts off from within 1 hour after facility operations conclude until within 1 hour before facility operations begin or as established by the jurisdiction. Where facility operations are continuous, decorative lighting of building facades and landscape features shall automatically shut off from midnight until 6:00 a.m.

PROPOSED ACTION: Delete

RATIONALE / IMPACT: Redundant: covered by 2012 IECC (C405.6, C405.2.4)

2011 ASHRAE 189.1 CORRELATION: 5.3.3, 7.4.6.5, 7.4.6.5.1, 7.4.6.5.2

608.5 Automatic daylight controls. Automatic daylight controls shall be provided in daylit areas complying with Section 808.3.1 or Section 808.3.2 to control the lights serving those areas. General lighting in a sidelighting daylit area that is within one window head height shall be separately controlled by automatic daylight controls. Exception: Automatic daylight controls are not required for the following spaces and equipment: 1. Toplighting daylit areas where the skylight is located in a portion of the roof that is shaded during the peak sun angle on the summer solstice by permanent features of the building or by permanent features of adjacent buildings. 2. Sidelighting daylit areas where the fenestration is located in an obstructed exterior wall that does not face a public way or a yard or court complying with Section 1206 of the International Building Code or where the distance to any buildings, structures, or geological formations in front of the wall is less than two times the height of the buildings, structures, or geological

formations. 3. Daylit areas served by less than 90 watts of lighting. 4. Spaces where medical care is directly provided. 5. Spaces within dwelling units or sleeping units. 6. Lighting required to comply with Section C405.2.3 of the International Energy Conservation Code.

PROPOSED ACTION: Delete

RATIONALE / IMPACT: Redundant: covered by 2012 IECC (C405.2.2.3.2)

2011 ASHRAE 189.1 CORRELATION: 8.3.4, 8.4.1, and 8.5.1

608.6 Plug load controls. Receptacles and electrical outlets in the following spaces shall be controlled by an occupant sensor or time switch as follows: 1. In Group B office spaces without furniture systems incorporating wired receptacles, not less than one controlled receptacle shall be provided for each 50 square feet (4.65 m²). 2. In Group B office spaces with furniture systems incorporating wired receptacles, not less than one controlled circuit shall be provided at each electrical outlet used for powering furniture systems. 3. In classrooms in Group B and Group E occupancies, not less than four controlled receptacles shall be provided in each classroom. 4. In copy rooms, print shops, and computer labs, not less than one controlled receptacle shall be provided for each data jack. 5. In spaces with an overhead cabinet above a counter or work surface, not less than one controlled receptacle shall be provided for each work surface.

608.6.1 Distribution and marking. Controlled receptacles and electrical outlets shall be distributed in a reasonably uniform pattern throughout each space. Controlled receptacles shall be marked to differentiate them from uncontrolled receptacles.

608.6.2 Furniture systems. Furniture systems incorporating wired receptacles shall include not less than two receptacles at each workstation that are connected to a controlled circuit.

608.6.3 Computer office equipment. Computer monitors, plug in space heaters, air purifiers, radios, computer speakers, coffee makers, fans, and task lights located in spaces with controlled receptacles shall be plugged into controlled receptacles.

608.6.4 Audio and visual systems. Displays, projectors, and audio amplifiers in Group B and Group E classrooms, conference and meeting rooms, and multipurpose rooms shall be controlled by an occupant sensor.

608.6.5 Water dispensers. Water dispensers that utilize energy to cool or heat drinking water shall be controlled by time switch controls.

608.6.6 Refrigerator and freezer cases. Lighting integral to vending machines and refrigerator and freezer cases shall be controlled by an occupant sensor or a time switch.

PROPOSED ACTION: Delete

RATIONALE / IMPACT: Impractical and poorly written

2011 ASHRAE 189.1 CORRELATION: None

608.7 Fuel gas lighting systems. Fixtures that generate illumination by combustion of fuel gas shall be included in lighting power calculations required under Sections C405.5 and C405.6 of the International Energy Conservation Code by converting the maximum rated Btu/h of the luminaire into watts using Equation 6-5. Wattage Equivalent Maximum btu/h rating of the fuel gas lighting system/3.413. Equation 6-5 Exception: Fuel gas lighting at historic buildings in accordance with Section C101.4.2 of the International Energy Conservation Code is not included in the calculation. 608.7.1 Continuously burning pilot lights. Fixtures that generate illumination by combustion of fuel gas shall not contain continuously burning pilot lights.

PROPOSED ACTION: No Action

RATIONALE / IMPACT: If applies, may fall under International Fuel Gas Code

2011 ASHRAE 189.1 CORRELATION:

608.8 Electrical system efficiency. Electrical systems shall comply with Section 608.8.1.

608.8.1 Prescriptive compliance. Prescriptive compliance for electrical systems shall be in accordance with Sections 608.8.1.1 through 608.8.1.3. 608.8.1.1 Transformer efficiency. Distribution transformers installed on the load side of the service disconnecting means shall comply with the provisions of Tables 608.8.1.1(1), 608.8.1.1(2) and 608.8.1.1(3), and the Energy Policy Act of 2005 as applicable. Exception: The following transformers are exempt from the efficiency standards of Section 608.8.1.1: 1. Transformers not covered by the Energy Policy Act of 2005. 2. Transformers for special purpose applications, and not used in general purpose applications. 3. Transformers with multiple voltage taps where the highest tap is not less than 20 percent more than the lowest tap. 4. Drive transformers, rectifier transformers, auto-transformers, uninterruptible power supply transformers, impedance transformers, regulating transformers, sealed and non-ventilating transformers, machine tool transformers, welding transformers, grounding transformers, and testing transformers.

608.8.1.2 Voltage drop in feeders. The voltage drop in feeder conductors shall not exceed 1.5 percent at design load.

608.8.1.3 Voltage drop in branch circuits. The voltage drop in branch circuit conductors shall not exceed 1.5 percent at design load. PROPOSED ACTION: Adopt as written
RATIONALE / IMPACT: Consistent with current practice 2011 ASHRAE 189.1
CORRELATION: None 608.9 Exterior lighting. Exterior lighting shall comply with Sections C405.6.1 and C405.6.2 of the International Energy Conservation Code regardless of how the power for that lighting is supplied. Exception: Lighting for the following purposes is exempt: 1. Where approved because of historical, safety, signage, or emergency lighting considerations. 2. Roadway lighting required by governmental authorities.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: Consistent with current practice

2011 ASHRAE 189.1 CORRELATION: 7.4.6.3

608.10 Verification of lamps and ballasts. Prior to issuance of a certificate of occupancy, the field inspector shall confirm the installation of luminaires, type and quantity; lamps, type, wattage and quantity, and ballasts, type and performance for not less than one representative luminaire of each type, for consistency with the approved construction documents. Where a discrepancy is found, energy calculations shall be revised and resubmitted.

PROPOSED ACTION: Move to Appendix A - Adopt as written

RATIONALE / IMPACT: Good practice; may be difficult to implement for all projects

2011 ASHRAE 189.1 CORRELATION: None 608.11 Verification of lighting controls. Prior to issuance of a certificate of occupancy, the field inspector shall confirm the installation of lighting controls shown on the approved construction documents. Where a discrepancy is found, the installation shall be reviewed for conformance to the International Energy Conservation Code and Sections 608.2, 608.3, 608.4, 608.5, and 608.6.

PROPOSED ACTION: Delete

RATIONALE / IMPACT: Redundant: covered by IECC 408.3

2011 ASHRAE 189.1 CORRELATION: 7.4.6.2, 7.4.6.4, 7.4.6.5

608.12 Main electrical panel rating. The main electrical service entrance panel for the building shall be listed and labeled as a suitable connection to an onsite renewable energy source.

PROPOSED ACTION: Delete

RATIONALE / IMPACT: Current technology is cost prohibitive

2011 ASHRAE 189.1 CORRELATION: 7.4.1.1

609.1 General. This section provides requirements for appliances and equipment installed in the building or on the building site. Permanent appliances and equipment shall comply with the provisions of Section 609.2, and portable appliances and equipment shall comply with the provisions of Section 609.3. Exception: Section 609 does not apply to appliances and equipment in compliance with Sections 605 through 608 and those specified in Table 609.1.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: Good Practice

2011 ASHRAE 189.1 CORRELATION:

609.2 Permanent appliances and equipment. Appliances and equipment that are permanently connected to the building energy supply systems shall comply with the provisions of Sections 609.2.1 through 609.2.4 as applicable. Such appliances and equipment shall be listed and labeled and installed in accordance with the manufacturer's installation instructions and the provisions and terms of their listing, the International Energy Conservation Code, International Fuel Gas Code, International Mechanical Code, International Plumbing Code and International Building Code, and shall be provided with controls and energy monitoring systems as required by this code.

609.2.1 Elevators. Elevator systems shall comply with Sections 609.2.1.1 through 609.2.1.2.3.

609.2.1.1 Lighting. The total lighting in each elevator cab shall be not less than 35 lumens per watt, based on the total lumens from lamps divided by the total wattage of the luminaires in the cab, but not including luminaires of signals and displays.

609.2.1.2 Power conversion system. Power conversion systems for traction elevators shall comply with Sections 609.2.1.2.1 through 609.2.1.2.3. 609.2.1.2.1 Motor. Induction motors with a Class IE2 efficiency rating, as defined by IEC EN 60034-30, or alternative technologies, such as permanent magnet synchronous motors that have equal or better efficiency, shall be used. 609.2.1.2.2 Transmission. Transmissions shall not reduce the efficiency of the combined motor/transmission below that shown for the Class IE2 motor. Gearless machines shall be assumed to have a 100-percent transmission efficiency.

609.2.1.2.3 Drive. Potential energy released during motion shall be recovered.

609.2.1.3 Ventilation. Cab ventilation fans shall have an efficacy greater than or equal to 3.0 cfm per watt (0.085 m³ /min./watt).

609.2.1.4 Standby mode. When the elevator is stopped, not occupied, and with doors closed, lighting, ventilation, and cab displays shall be capable of being de-energized within 5 minutes of stopping, and re-energized prior to opening the doors. Power shall cease to be applied to the door motor after the elevator is stopped, lighting is de-energized, and no one is in the cab, and re-energized upon the next passenger arrival. In buildings with multiple elevators serving the same floors, not less than half of the elevators shall be capable of switching to sleep, low-power mode, during periods of low traffic.

609.2.1.5 Guides. Elevator car guides shall be of the roller type, in order to reduce frictional energy losses. Counterweights with sliding guides shall be balanced in order to minimize frictional losses associated with the counterweight guides.

PROPOSED ACTION: Delete

RATIONALE / IMPACT: Regulated by MD DLLR

2011 ASHRAE 189.1 CORRELATION:

609.2.2 Escalators and moving walkways. Escalators and moving walkways shall comply with Sections 609.2.2.1 through 609.2.2.5.

609.2.2.1 Lighting. Light sources, including, but not limited to, balustrade lighting, comb-plate lighting and step demarcation lighting, shall have an efficacy of not less than 35 lm/W, based on the total lumens from lamps divided by the total wattage of the luminaires provided on the escalator or moving walk.

609.2.2.2 Drive system. Induction motors with a class IE3 efficiency rating, as defined by IEC EN 60034-30, or permanent magnet synchronous motors shall be used

609.2.2.3 Energy recovery. Down-running escalators equipped with direct variable frequency drives shall use regenerative drives and return recovered energy to the building electrical power system

609.2.2.5 Standby mode. During standby mode, escalators and moving walkways shall be capable of being automatically slowed to not greater than 50 percent of nominal speed. Escalators and moving walkways shall be capable of being automatically turned off when the building is unoccupied or outside of facility operations. In locations where multiple escalators serve the same passenger load, not less than 50 percent of the escalators shall have the capability of being turned off in response to reduced occupant traffic.

609.2.2.4 Handrails. Handrails shall use friction-reducing measures, such as, but not limited to, rollers in newels.

PROPOSED ACTION: Delete

RATIONALE / IMPACT: Regulated by MD DLLR

2011 ASHRAE 189.1 CORRELATION:

609.2.3 Commercial food service equipment. Not less than 50 percent of the commercial food service equipment installed shall comply with energy efficiency and water use as identified on Table 609.2.3, based on aggregate energy input rating.

PROPOSED ACTION: Adopt but replace language to be consistent with ASHRAE 189.1 Section 7.4.7.3

RATIONALE / IMPACT: Ambiguous

2011 ASHRAE 189.1 CORRELATION: 7.4.7.3

609.2.4 Conveyors. Motors associated with conveyors shall be sized to meet the expected load and designed to run within 90 percent of capacity at all times the conveyor is expected to operate. Conveyor motors shall be provided with sleep mode controls. Two-speed motors and adjustable-speed drives shall be provided where load weights are expected to vary. Readily accessible controls shall be provided to allow for manual shut off of the conveyor when the conveyor is not needed. Conveyor systems shall be designed to use gravity feed where conditions allow and arranged so that long straight runs are provided with as few drives as possible.

PROPOSED ACTION: Adopt as written

RATIONALE / IMPACT: Good practice

2011 ASHRAE 189.1 CORRELATION: None

610.1 Renewable energy systems requirements. Buildings that consume energy shall comply with this section. Each building or surrounding lot or building site where there are multiple buildings on the building site shall be equipped with one or more renewable energy systems in accordance with this section. Renewable energy systems shall comply with the requirements of Section 610.2 for solar photovoltaic systems, Section 610.3 for wind systems, or Section 610.4 for solar water heating systems, and Section 610.5 for performance monitoring and metering of these systems as approved by the code official. These systems shall be commissioned in accordance with the requirements of Section 611. Exception: Renewable energy systems are not required

for the following: 1. Buildings or building sites where there are multiple buildings on the building site providing not less than 2 percent of the total estimated annual energy use of the building, or collective buildings on the site, with onsite renewable energy using a combination of renewable energy generation systems complying with the requirements of Section 610.2, 610.3, or 610.4. 2. Where not less than 4 percent of the total annual building energy consumption from renewable generation takes the form of a 10-year commitment to renewable energy credit ownership, confirmed by the code official. 3. Where the combined application of onsite generated renewable energy and a commitment to renewable energy credit ownership as confirmed by the code official, totals not less than 4 percent of the total annual building energy consumption from renewable generation. 610.1.1 Building performance-based compliance. Buildings and surrounding property or building sites where there are multiple buildings on the building site, that are designed and constructed in accordance with Section 601.3.1, performance-based compliance, shall be equipped with one or more renewable energy systems that have the capacity to provide not less than 2 percent of the total calculated annual energy use of the building, or collective buildings on the site.

610.1.2 Building prescriptive compliance. Buildings and surrounding property or building sites where there are multiple buildings on the building site, that are designed and constructed in accordance with Section 601.3.2, prescriptive compliance, shall be equipped with one or more renewable energy systems that have the capacity to provide not less than 2 percent of the total estimated annual energy use of the building, or collective buildings on the building site, with onsite renewable energy by calculation demonstrating that onsite renewable energy production has a rating of not less than 1.75 Btu/h (0.5 W) or not less than 0.50 watts per square foot of conditioned floor area, and using any single or combination of renewable energy generation systems meeting the requirements of Sections 610.2, 610.3, or 610.4. 610.2 Solar photovoltaic systems. Solar photovoltaic systems shall be sized to provide not less than 2 percent of the total estimated annual electric energy consumption of the building, or collective buildings on the building site in accordance with Section 610.1.1 or 610.1.2. 610.2.1 Limitation. Solar photovoltaic systems shall not be used to comply with Section 610.1 where building sites have total global insolation levels lower than 2.00 kWh/ m² /day as determined in accordance with NREL SERI TR- 642-761. 610.2.2 Requirements. The installation, inspection, maintenance, repair and replacement of solar photovoltaic systems and system components shall comply with the manufacturer's instructions, Section 610.2.2.1, the International Fire Code, the International Building Code and NFPA 70.

610.2.2.1 Performance verification. Solar photovoltaic systems shall be tested on installation to verify that the installed performance meets the design specifications. A report of the tested performance shall be provided to the building owner. 610.3 Wind energy systems. Wind energy systems shall be designed, constructed and sized to provide not less than 2 percent of the total estimated annual electric energy consumption of the building, or collective buildings on the building site in accordance with NFPA 70 and Section 610.1.1 or 610.1.2. 610.3.1 Installation, location and

structural requirements. Wind energy systems shall be located on the building, adjacent to the building, or on the building site. 610.4 Solar water heating equipment. Not less than 10 percent of the building's annual estimated hot water energy usage shall be supplied by onsite solar water heating equipment. 610.5 Renewable energy system performance monitoring and metering. Renewable energy systems shall be metered and monitored in accordance with Sections 610.5.1 and 610.5.2. 610.5.1 Metering. Renewable energy systems shall be metered separately from the building's electrical and fossil fuel meters. Renewable energy systems shall be metered to measure the amount of renewable electric or thermal energy generated on the building site in accordance with Section 603. 610.5.2 Monitoring. Renewable energy systems shall be monitored to measure the peak electric or thermal energy generated by the renewable energy systems during the building's anticipated peak electric or fossil fuel consumption period in accordance with Section 603.

PROPOSED ACTION: Move to Appendix A – Adopt as written

RATIONALE / IMPACT: Discretionary

2011 ASHRAE 189.1 CORRELATION: 7.3.2

611.1 Mechanical systems commissioning and completion requirements. Within 60 days from approval conducting the final mechanical inspection, the registered design professional shall provide evidence of mechanical systems commissioning and completion of the mechanical system installation to the code official, in accordance with the International Energy Conservation Code. Drawing notes shall clearly indicate provisions for commissioning and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the owner and made available to the code official upon request.

611.1.1 Commissioning plan. A commissioning plan shall be developed by a registered design professional or approved agency and shall include as a minimum all of the following items: 1. A narrative describing the activities that will be accomplished during each phase of commissioning, including guidance on who accomplishes the activities and how they are completed. 2. Equipment and systems to be tested including, but not limited to, the specific equipment, appliances or systems to be tested and the number and extent of tests. 3. Functions to be tested including, but not limited to, calibrations and economizer controls. 4. Conditions under which the test shall be performed including, but not limited to, affirmation of winter and summer design conditions and full outside air. 5. Measurable criteria for performance. 611.1.2 Systems adjusting and balancing. HVAC systems shall be balanced in accordance with generally accepted engineering standards. Air and water flow rates shall be measured and adjusted to deliver final flow rates within the tolerances provided in the product specifications. Test

and balance activities shall include, at a minimum, the provisions of Sections 611.1.2.1 and 611.1.2.2.

611.1.2.1 Air systems balancing. Each supply air outlet and zone terminal device shall be equipped with a means for air balancing in accordance with the International Mechanical Code. Discharge dampers are prohibited on constant volume fans and variable volume fans with motors of 10 hp (7.35 kW) and larger. Air systems shall be balanced in a manner to first minimize throttling losses then, for fans with system power of greater than 1 hp (735 W), fan speed shall be adjusted to meet design flow conditions. Exception: Fans with fan motor horsepower of 1 hp (735 W) or less.

611.1.2.2 Hydronic systems balancing. Individual hydronic heating and cooling coils shall be equipped with means for balancing and measuring flow. Hydronic systems shall be proportionately balanced in a manner to first minimize throttling losses, then the pump impeller shall be trimmed or pump speed shall be adjusted to meet design flow conditions. Each hydronic system shall have either the capability to measure pressure across the pump, or shall have test ports at each side of each pump. Exceptions: 1. Pumps with pump motors of 5 hp (3677 W) or less. 2. Where throttling results in not greater than 5 percent of the nameplate horsepower draw above that required if the impeller were trimmed.

611.1.3 Functional performance testing. Functional performance testing shall be in accordance with the requirements of Sections 611.1.3.1, 611.1.3.2 and 611.1.3.3.

611.1.3.1 Equipment. Equipment functional performance testing shall demonstrate the installation and operation of components, systems, and system-to-system interfacing relationships in accordance with approved plans and specifications so that operation, function, and maintenance serviceability for each of the commissioned systems is confirmed. Testing shall include all specified modes of control and sequence of operation, including under full-load, part-load and all of the following emergency conditions: 1. Each mode as described in the sequence of operation. 2. Redundant or automatic backup mode. 3. Performance of alarms. 4. Mode of operation upon a loss of power and restoration of power 611.1.3.2 Controls. HVAC control systems shall be tested to document that control devices, components, equipment, and systems are calibrated, adjusted and operated in accordance with the approved plans and specifications. Sequences of operation shall be functionally tested to document that they operate in accordance with the approved plans and specifications.

611.1.3.3 Economizers. Air economizers shall undergo a functional test to determine that they operate in accordance with the manufacturer's specifications.

611.1.4 Preliminary commissioning report. A preliminary report of commissioning test procedures and results shall be completed and certified by the registered design professional or approved agency and provided to the building owner. The report shall be

identified as "Preliminary Commissioning Report" and shall identify all of the following:

1. Itemization of deficiencies found during testing required by this section that have not been corrected at the time of report preparation. 2. Deferred tests that cannot be performed at the time of report preparation because of climatic conditions. 3. Climatic conditions required for performance of the deferred tests.

611.1.4.1 Acceptance. Buildings, or portions thereof, shall not pass the final mechanical inspection until such time as the code official has received a letter of transmittal from the building owner acknowledging that the building owner has received the Preliminary Commissioning Report.

611.1.4.2 Copy. At the request of the code official, a copy of the Preliminary Commissioning Report shall be made available for review.

611.1.4.3 Certification. A certification, signed and sealed by the registered design professional, documenting that the mechanical and service water heating systems comply with Sections C403 and C404 of the International Energy Conservation Code, shall be provided to the code official.

611.1.5 Completion requirements. The construction documents shall specify that the requirements described in this section be provided to the building owner within 90 days of the date of receipt of the certificate of occupancy.

611.1.5.1 Drawings. Construction documents shall include the location of and performance data pertaining to each piece of equipment.

611.1.5.2 Manuals. An operating and maintenance manual in accordance with industry-accepted standards shall be provided and shall include all of the following: 1. Submittal data stating equipment size and selected options for each piece of equipment requiring maintenance. 2. Manufacturer's operation manuals and maintenance manuals for each piece of equipment requiring maintenance, except equipment not furnished as part of the building project. Required routine maintenance shall be clearly identified. 3. Names and addresses of not less than one service agency. A systems manual shall be provided and shall include all of the following: 1. HVAC controls system maintenance and calibration information, including wiring diagrams, schematics, and control sequence descriptions. Desired or field-determined set-points shall be permanently recorded on control drawings at control devices or, for digital control systems, in programming comments. 2. A complete narrative of how each system is intended to operate, including recommended set-points, seasonal changeover information and emergency shutdown operation. 3. Control sequence descriptions for lighting, domestic hot water heating and all renewable energy systems complete with a description of how these systems connect to, and are controlled in conjunction with, the overall building system.

611.1.5.3 System balancing report. A written report describing the activities and measurements completed in accordance with Section 611.1.2 shall be provided.

611.1.5.4 Final commissioning report. A complete report of test procedures and results identified as "Final Commissioning Report" shall be completed and provided to the building owner. The report shall include all of the following: 1. Results of all functional performance tests. 2. Disposition of all deficiencies found during testing, including details of corrective measures used or proposed. 3. All functional performance test procedures used during the commissioning process including measurable criteria for test acceptance, provided herein for repeatability. Exception: Deferred tests that were not performed at the time of report preparation because of climatic conditions.

611.1.5.5 Post-occupancy recommissioning. The commissioning activities specified in Sections 611.1.2 through 611.1.5 shall be repeated 18 to 24 months after certificate of occupancy. Systems and control devices that are not functioning properly shall be repaired or replaced. Adjustments to calibration settings shall be documented. This documentation shall be provided to the building owner. 611.2 Sequence of operation. A sequence of operation shall be developed and finalized upon commissioning, when the operational details are initialized and validated. A sequence of operation shall be the final record of system operation, and shall be included on the control diagram "as-built," or as part of the education and operation and maintenance document that is provided to the owner. 611.3 Lighting and electrical systems commissioning and completion requirements. Prior to issuance of a certificate of occupancy, the registered design professional shall provide evidence of lighting and electrical systems commissioning and completion in accordance with the International Energy Conservation Code and the provisions of this section. Drawing notes shall specify the provisions for commissioning and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the owner and made available to the code official upon request in accordance with Sections 611.2.4 and 611.2.5 611.3.1 Preconstruction documentation, lighting. Construction and owner education documents shall include floor plans, diagrams and notations of sufficient clarity describing the types of, location and operational requirements of all lighting controls including a sequence of operation and preliminary intended set-points for all dimming systems and automatic daylight controls, demonstrating conformance to the provisions of this code, relevant laws, ordinances, rules and regulations, as approved by the code official.

611.3.2 Verification. The approved agency conducting commissioning shall verify that controls have been installed in accordance with the approved construction documents. Any discrepancies shall be reviewed for compliance with Section 608 and the requirements of Section C405.2 of the International Energy Conservation Code.

611.3.3 Commissioning. Lighting controls shall be commissioned in accordance with this section.

611.3.3.1 Occupant sensors. It shall be verified that the functional testing in accordance with Section C405.2 of the International Energy Conservation Code has been performed.

611.3.3.2 Automatic daylight controls. Automatic daylight controls shall be commissioned in accordance with all of the following: 1. It shall be verified that the placement and orientation of each sensor is consistent with the manufacturer's instructions. If not, the sensor shall be relocated or replaced. 2. Control systems shall be initially calibrated to meet settings and design intent established in the construction documents. 3. Prior to calibration of systems controlling dimmable luminaires, all lamps shall be seasoned in accordance with the recommendations of the lamp manufacturer. 4. Where located inside buildings, calibration of open-loop daylight controls, which receive illumination from natural light only, shall not occur until fenestration shading devices such as blinds or shades have been installed and commissioned. 5. Calibration of closed-loop daylight controls, that receive illumination from both natural and artificial light, shall not occur until furniture systems and interior finishes have been installed, and any fenestration shading devices such as blinds or shades have been installed and commissioned. 6. Calibration procedures shall be in accordance with the manufacturer's instructions.

611.3.3.3 Time switch and programmable schedule controls. Lighting controls installed in accordance with Section 608 shall be programmed. Scheduling shall incorporate weekday, weekend and holiday operating times, including leap year and daylight savings time corrections. It shall be verified that system overrides work and are located in compliance with Section C405.2 of the International Energy Conservation Code.

611.3.3.4 Dimming systems with preset scenes. For programmable dimming systems, it shall be verified that automatic shutoff and manual overrides are working and that programming is complete. Prior to programming, all lamps shall be seasoned in accordance with NEMA LSD 23.

611.3.4 Post-commissioning documentation. The following documentation shall be provided to the building owner in accordance with Section 903. 1. Settings determined during commissioning activities outlined in Section 611.3.3. 2. A narrative describing the intent and functionality of all controls including any capability for users to override a schedule or master command. 3. Specification sheets for all lighting equipment and controls. 4. Operation manuals for each lighting control device. Required maintenance and maintenance schedules shall be clearly identified. Documentation and instructions necessary for building maintenance personnel to RETAIN and recalibrate lighting systems and controls. 5. An annual inspection schedule for lighting controls. 6. Troubleshooting information for fluorescent dimming systems and the remediation of switching issues such as false-ons and false-offs. 611.3.5 Post-occupancy recommissioning. The commissioning activities in Section 611.3.3 shall be repeated 18

to 24 months after issuance of the certificate of occupancy. Control devices that are not functioning properly shall be repaired or replaced. Adjustments to calibration settings shall be documented. This documentation shall be provided to the building owner.

611.4 Building envelope systems commissioning and completion requirements. Prior to issuance of a certificate of occupancy, the registered design professional shall provide evidence of building thermal envelope systems commissioning and completion to the building owner in accordance with the International Energy Conservation Code and the provisions of this section. Construction documents shall specify the provisions for commissioning and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the building owner and made available to the code official upon request in accordance with Sections 611.4.1 and 611.4.2.

611.4.1 Preconstruction documentation, building thermal envelope. Construction and owner education documents shall indicate the location, nature and extent of the work proposed and show the functional requirements and operation of all building thermal envelope systems demonstrating conformance to the provisions of this code, relevant laws, ordinances, rules and regulations, as approved by the code official 611.4.2 Verification. The approved agency conducting commissioning shall verify that building thermal envelope systems have been installed in accordance with the approved construction documents. Any discrepancies shall be reviewed for compliance with requirements of the International Energy Conservation Code and this code.

PROPOSED ACTION: Move to Chapter 9 - Adopt as written

RATIONALE / IMPACT: Consistent with current practice - All commissioning activities should be in one chapter for better coordination to eliminate confusion and redundancy.

2011 ASHRAE 189.1 CORRELATION: Chapter 10

Christiane Graham, 4112 Decatur Avenue, Kensington MD 20895 (301 949 2624)

IGCC hearing, June 11, 2014

CO2 output and climate change are my main concern. Although I present at this particular Public Work Session CO2 reduction concerns are addressed throughout the IGCC, a clear, 74% mandatory construction code for our county. As a resident of Kensington, and member of the "Save Kensington Group" we support the adoption of the IGCC.

I want to express my appreciation for this Public work session, the Maryland Legislature and Governor O'Malley for signing legislation that keeps Maryland solidly on the green path. Published studies show that green buildings cost less to operate, command higher resale prices and demonstrate a history of leasing up faster and retaining tenants than non-green buildings."

Our neighborhood is slated for redevelopment as projected by the Kensington Sector Plan passed in March 2012. I want to draw your attention to 4 areas. First, the CO2 output predictions for our "developed" neighborhood; second is the impact on the Rock Creek Watershed; third transportation issues; fourth "Heat Island Effect" mitigation.

1. Under the current Kensington Sector Plan, CO2 is projected to triple by 2030. This is unacceptable and represents a pitifully low standard for the county. CO2 reduction is critical for the entire planet, not just Montgomery County. "The Years of Living Dangerously" currently aired on Showtime demonstrates the dire consequences of playing possum. Several chapters of the IGCC address CO2 mitigation.
2. Storm water treatment and intelligent site development will be crucial to new development in Kensington and everywhere in the county. Increased run off from violent storms into Rock Creek is a liability and our responsibility, likewise for all streams in the Chesapeake watershed. IGCC has practical and productive rules around storm water mitigation.
3. The Marc train is a commuter rail. We do not have Metro, which is very different from our neighbors Silver Spring, and Bethesda. People traveling in and through Kensington use cars, we want increase in save bicycles paths, buses and walk areas.
<http://www.traffictechnologytoday.com/features.php?BlogID=718>. Reducing traffic lights in Kensington will save 25 % of CO2 from idling engines and the increased CO2 output when engines accelerate. We must better funnel traffic from cross streets and create foot traffic bridges to mitigate CO2. Residents of West and East of Connecticut Avenue shall be friends not strangers due to massive rush hour and daytime traffic that divides us.
4. "Heat Island effect" mitigation with green roofs, tree plantings, green walks is mandated by IGCC. Active solar electricity generation in free standing buildings of 75', 65' and 45' height are practical here, since there is no shade from trees. Increased natural light, state of the art insulation, user friendly fenestration in building construction creates better consumer satisfaction and reduces electricity demands. Modern metering technology is essential as addressed in Chapter 6 of IGCC.

Moving our country forward in green development is a lucrative opportunity for architects, developers and manufacturers. If Germany a cold, rainy Northern European country can generate 74 % of 1 day's energy needs by solar imagine what we can do here.

We cannot afford to continue business as usual. "It is too big a problem", "the Chinese are at fault", "it will happen later" "It is too expensive" are all excuses and evasions. Climate change is with us now. We can and must do better in Montgomery County, I ask you to embrace and approve the comprehensive IGCC.

Thank you

WSSC comments for Chapter 6 of the 2012 IGCC

June 9, 2014; by Tom Buckley

Sec. XX. Section 601.3 **Application.**

WSSC Comment: Delete reference to Section 607.

Sec. 17. Section 607.1 **Prescriptive compliance.**

WSSC Comment: Do not use Mont. Co suggested language. WSSC proposal: Delete entire section and replace with: Service water heating systems shall comply with the latest provisions of the WSSC Plumbing and Fuel Gas Code. Exception: Sections 607.3 and 607.4 of this Code shall apply.

Sec. XX. Section 607.2.

WSSC Comment: Delete reference to Section 607.2.2 and delete 607.2.2. These temperature ranges greatly conflict with safe hot water storage temperature protocols relative to bacteria growth.

Sec XX. Section 607.5 **Waste water heat recovery systems.**

WSSC Comment: Delete entire section. Research has not produced a recognized plumbing standard/listing for a safe heat transfer product. *True* double wall heat exchangers provide a minimum free air space between the two pipe walls to establish adequate cross connection/backflow prevention protection.

Sec. XX. Section 607.6 **Service water heating piping insulation**

WSSC Comment: Delete entire section. Replace with: Domestic hot water system insulation shall comply with the latest provisions of the WSSC Plumbing and Fuel gas Code. Add individual insulation requirements to sections 607.3 and 607.4.

Sec. XX. Section 607.6.1 **Buried piping**

WSSC Comment: Delete entire section. Insulation shall be the same thickness as specified for above grade applications. Insulation material shall be compatible for direct burial in accordance with manufacturer's specification for the intended soil and moisture conditions. WSSC will add similar language to the plumbing code on the next cycle. Note; below grade installation of new domestic hot water systems are rare.

Sec. XX. Section 607.7 **Circulating hot water systems.**

WSSC Comment: Delete entire section. Replace with: Circulating hot water systems shall comply with the latest provisions of the WSSC Plumbing and Fuel gas Code.

Sec. XX. Section 609.2.3 **Commercial food service equipment.**

WSSC Comment: WSSC staff is not comfortable commenting on the provisions of this section or Table 609.2.3. Is County staff going to enforce? Otherwise, all of these provisions need to be vetted or deleted.