

AIA Potomac Valley

A Chapter of the American Institute of Architects

February 4, 2014

Ms. Diane Schwartz-Jones, Director
Department of Permitting Services
255 Rockville Pike, 2nd Floor
Rockville, Maryland 20850-4166

Copy via email to diane.jones@montgomerycountymd.gov

Dear Ms. Schwartz-Jones,

Re: AIA-Potomac Valley Chapter, IgCC/ASHRAE 189.1 Task Force Recommendations

On July 30, 2013, the AIA-Potomac Valley Chapter (AIA-PV) submitted recommendations to you in regard to possible adoption of the International Green Construction Code (IgCC). As you know, the AIA-PV has a task force group who has been working together on this subject matter for some time. The group is comprised of a multi-disciplinary group of design professionals: architects, engineers, a developer/landscape architect, a builder, and others.

This letter provides supplemental information that responds to your staff's request that our group also review and make recommendations in regard to possible adoption of the ANSI/ASHRAE/USGBC/IES Standard 189.1-2011 -- Standard for the Design of High-Performance Green Buildings, Except Low-rise Residential Buildings (also referred to as ASHRAE 189.1, 2011). ASHRAE 189.1 is an alternative means of compliance incorporated into the IgCC 2012 codebook. We hope this additional information meets your needs:

As mentioned in our July 30, 2013 letter, the AIA-PV group still recommends that Montgomery County:

- Refer to our July 30, 2013 Executive Summary (Attachment A) and detailed recommendations previously submitted
- Proceed slowly and cautiously in order to give design professionals, builders, and owner's time to acclimate to the requirements, especially criteria that have the potential to slow economic development in the county while other nearby jurisdictions are taking a measured approach or not yet shifting to these codes.
- Adopt the IgCC and alternative compliance paths (including ASHRAE 189.1) and do away with the current Montgomery County Green Building Law.

In addition, we recommend you create an industry advisory panel to make a solid implementation plan with the Department of Environmental Protection (DEP). We feel this is important because most of the details and issues to implement the County Council's proposed green building legislation are at the direction and responsibility of the Director of DEP and because those legislations overlap with requirements in green building codes that DPS is proposing.

The following items in Attachment B summarize the detailed analysis and recommendations of the AIA-PV-Task Force in regard to ASHRAE 189.1*:

- Section 5, Site Sustainability
- Section 6, Water Use Efficiency
- Section 7, Energy Efficiency
- Section 8, Indoor Environmental Quality
- Section 9, The Building's Impact on the Atmosphere, Materials, and Resources
- Section 10, Construction and Plans for Operation

* Unlike the IgCC, ASHRAE 189.1 does not have a chapter for historic and existing buildings so comments on those building types have been incorporated into each section's recommendations.

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Once you have had a chance to review our recommendations, the PV-Task Force members would be pleased to meet with you in person to answer questions, clarify our recommendations, or address any item of interest that we may have overlooked. Thank you for giving us this opportunity to assist you.

Sincerely,



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Attachment A: AIA-PV July 30, 2013 IgCC Executive Summary

Attachment B: AIA-PV ASHRAE 189.1 Recommendations

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ATTACHMENT B

AIA-PV Detailed ASHRAE 189.1 Recommendations

February 4, 2014

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SECTION 5 – Site Sustainability
2011 ASHRAE 189.1
Analysis with Recommendations

2011 – ASHRAE 189.1 – Section 5 – Site Sustainability
Summary:
Analysis and Recommendations
5.3.1 Site Selection. This section stipulates the permissible locations for development. Recommendation: Strike section in its entirety. Justification: Allowable building sites are already regulated by M-NCPPC, the Army Corps of Engineers, Maryland DOE and Montgomery County DPS. IGCC Comparison: AIA–PV had recommended that the analogous section in IGCC (402) be stricken in its entirety. Notes, References, Citations:
5.3.1.2 Prohibited Site Activity: Limitations for Wetland, Flood plane, fish and wildlife habitats. Recommendation: Recommend additional language to cover historically protected architectural and archeological sites. Justification: Justified by necessary coordination of AHJ, State and NHPA. As Req'd by NHPA. Notes, References, Citations: Refer to the National Historic Preservation Act of 1966.
5.3.3 Reduction of Light Pollution. This section regulates backlight, glare and uplight. Recommendation: Strike section in its entirety. Justification: Light pollution will be regulated under 59–7.5.4 of the proposed zoning ordinance. IGCC Comparison: AIA–PV had recommended that the analogous section in IGCC (409) be stricken in its entirety. Notes, References, Citations:

SECTION 6 – Water Use Efficiency
2011 ASHRAE 189.1
Analysis with Recommendations

2011 – ASHRAE 189.1 Section 6 – Water Use Efficiency
Summary: This 4 page section covers potable and non-potable Site and Building Water Use Reduction
Analysis and Recommendations
6.1 Scope. This section specifies requirements for potable water and non-potable water use efficiency, both for the site and for the building, and water monitoring Recommendation: Adopt Justification: Water use reduction is essential; the scope described is basic and doable. IgCC Comparison: The 17 pages of the IgCC cover the same ground this standard covers in 4, both have items redundant with the plumbing code and local regulations. Notes, References, Citations: WSSC regulations, ICC IPC
6.2 Scope. This section requires compliance with Mandatory Provisions, and either Prescriptive or Performance Options Recommendation: Adopt Justification: Sensible flexibility IgCC Comparison: Notes, References, Citations:
6.3.1.1 Landscape Design. A minimum of 60% of the area of the improved landscape shall be in bio-diverse planting of native plants and adapted plants other than turfgrass. Exception: The area of dedicated athletic fields, golf courses, and driving ranges shall be excluded from the calculation of the improved landscape for schools, residential common areas, or public recreational facilities. Recommendation: Do Not Adopt Justification: The exemptions outnumber the approved uses; "public recreational facilities" is unclear IgCC Comparison: Notes, References, Citations:

SECTION 6 – Water Use Efficiency
2011 ASHRAE 189.1
Analysis with Recommendations

6.3.1.1 Landscape Design: **Exception:** Area dedicated to athletic fields, residential common areas or public recreation areas.

Recommendation: Do not adopt until language to cover historically protected architectural and archeological sites is added.

Justification: Justified by necessary coordination of AHJ, State and NHPA. As req'd by NHPA.

Ashrae 189.1 Comparison: No direct requirement for tenant occupancies.

Notes, References, Citations: None

6.3.1.2 Irrigation System Design. Hydrozoning of automatic irrigation systems to water different plant materials such as turfgrass versus shrubs is required. Landscaping sprinklers shall not be permitted to spray water directly on a building and within 3 ft (1 m) of a building.

Recommendation: Adopt

Justification: While irrigation is not a good idea, if it is done, this requires high performance

IgCC Comparison: Collected rainwater has no restrictions on use

Notes, References, Citations: Gray water irrigation could be treated differently but is not addressed.

6.3.1.3 Controls. Any irrigation system for the project site shall be controlled by a qualifying smart controller that uses ET and weather data to adjust irrigation schedules and that complies with the minimum requirements or an on-site rain or moisture sensor that automatically shuts the system off after a predetermined amount of rainfall or sensed moisture in the soil. Qualifying smart controllers shall meet the minimum requirements as listed below when tested in accordance with IA SWAT Climatological Based Controllers 8th Draft Testing Protocol. Smart controllers that use ET shall use the following inputs for calculating appropriate irrigation amounts: a. Irrigation adequacy—80% minimum ET c b. Irrigation excess—not to exceed 10%.

Exception: A temporary irrigation system used exclusively for the establishment of new landscape shall be exempt from this requirement. Temporary irrigation systems shall be removed or permanently disabled at such time as the landscape establishment period has expired.

Recommendation: Adopt

Justification: While irrigation is not a good idea, if it is done, this requires high performance

IgCC Comparison: Collected rainwater has no restrictions on use

Notes, References, Citations: Gray water irrigation could be treated differently but is not addressed.

SECTION 6 – Water Use Efficiency
2011 ASHRAE 189.1
Analysis with Recommendations

6.3.2.1 Plumbing Fixtures and Fittings. Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with the following requirements:

- a. Water closets (toilets)—flushometer valve type: For single flush, maximum flush volume shall be determined in accordance with ASME A112.19.2/CSA B45.1 and shall be 1.28 gal (4.8 L). For dual-flush, the effective flush volume shall be determined in accordance with ASME A112.19.14 and shall be 1.28 gal (4.8 L).
- b. Water closets (toilets)—tank-type: Tank-type water closets shall be certified to the performance criteria of the U.S. EPA WaterSense Tank-Type High-Efficiency Toilet Specification and shall have a maximum flush volume of 1.28 gal (4.8 L).
- c. Urinals: Maximum flush volume when determined in accordance with ASME A112.19.2/CSA B45.1—0.5 gal (1.9 L). Non-water urinals shall comply with ASME A112.19.19 (vitreous china) or IAPMO Z124.9 (plastic) as appropriate.
- d. Public lavatory faucets: Maximum flow rate—0.5 gpm (1.9 L/min) when tested in accordance with ASME A112.18.1/CSA B125.1.
- e. Public metering self-closing faucet: Maximum water use—0.25 gal (1.0 L) per metering cycle when tested in accordance with ASME A112.18.1/CSA B125.1.
- f. Residential bathroom lavatory sink faucets: Maximum flow rate—1.5 gpm (5.7 L/min) when tested in accordance with ASME A112.18.1/CSA B125.1. Residential bathroom lavatory sink faucets shall comply with the performance criteria of the USEPA WaterSense High-Efficiency Lavatory Faucet Specification.
- g. Residential kitchen faucets: Maximum flow rate— 2.2 gpm (8.3 L/min) when tested in accordance with ASME A112.18.1/CSA B125.1.
- h. Residential showerheads: Maximum flow rate—2.0 gpm (7.6 L/min) when tested in accordance with ASME A112.18.1/CSA B125.1.
- i. Residential shower compartment (stall) in dwelling units and guest rooms: The allowable flow rate from all shower outlets (including rain systems, waterfalls, bodysprays, and jets) that can operate simultaneously shall be limited to a total of 2.0 gpm (7.6 L/min).

Exception: Where the area of a shower compartment exceeds 2600 in.² (1.7 m²) an additional flow of 2.0 gpm (7.6 L/min) shall be permitted for each multiple of 2600 in.² (1.7 m²) of floor area or fraction thereof.

TABLE 6.3.2.1 Plumbing Fixtures and Fittings Requirements

Plumbing Fixture	Maximum
Water closets (toilets)—flushometer valve type	Single flush volume of 1.28 gal (4.8 L)
Water closets (toilets)—flushometer valve type	Effective dual flush volume of 1.28 gal (4.8 L)
Water closets (toilets)—tank-type	Single flush volume of 1.28 gal (4.8 L)
Water closets (toilets)—tank-type	Effective dual flush volume of 1.28 gal (4.8 L)
Urinals	Flush volume 0.5 gal (1.9 L)
Public lavatory faucets	Flow rate—0.5 gpm (1.9 L/min)
Public metering self-closing faucet	0.25 gal (1.0 L) per metering cycle
Residential bathroom lavatory sink faucets	Flow rate—1.5 gpm (5.7 L/min)
Residential kitchen faucets	Flow rate—2.2 gpm (8.3 L/min)
Residential showerheads	Flow rate—2.0 gpm (7.6 L/min)
Residential shower compartment (stall) in dwelling units and guest rooms	Flow rate from all shower outlets total of 2.0 gpm (7.6 L/min)

Recommendation: Adopt if necessary and with consultation with WSSC. Ideally, WSSC would change their values, and this would not be adopted.

Justification: These values exceed WSSC suggested fixture standards, but are appropriate.

SECTION 6 – Water Use Efficiency
2011 ASHRAE 189.1
Analysis with Recommendations

6.3.2.2 Appliances a. Clothes washers and dishwashers installed within dwelling units shall comply with the ENERGY STAR Program Requirements for Clothes Washers and ENERGY STAR Program Requirements for Dishwashers. Maximum water use shall be as follows:

1. Clothes Washers—maximum Water Factor of 6.0 gal/ft³ of drum capacity (800 L/m³ of drum capacity).
 2. Dishwashers—maximum Water Factor of 5.8 gal/ full operating cycle (22 L/full operating cycle). (See also the energy efficiency requirements in Section 7.4.7.3.)
- b. Clothes washers installed in publicly accessible spaces (e.g., multifamily and hotel common areas) and coin- and card-operated clothes washers of any size used in laundromats shall have a maximum Water Factor of 7.5 gal/ft³ of drum capacity-normal cycle (1.0 kL/m³ of drum capacity-normal cycle). (See also the energy efficiency requirements in Sections 7.4.7.3 and 7.4.7.4.)

Recommendation: Adopt

Justification: EnergyStar standards are commonly included in sustainability standards

IgCC Comparison: These appliances not covered

Notes, References, Citations:

6.3.2.3 HVAC Systems and Equipment

- a. Once-through cooling with potable water is prohibited.
- b. Cooling towers and evaporative coolers shall be equipped with makeup and blowdown meters, conductivity controllers, and overflow alarms in accordance with the thresholds listed in Table 6.3.3B. Cooling towers shall be equipped with efficient drift eliminators that achieve drift reduction to a maximum of 0.002% of the recirculated water volume for counterflow towers and 0.005% of the recirculated water flow for cross-flow towers.
- c. Building projects located in regions where the ambient mean coincident wet-bulb temperature at 1% design cooling conditions is greater than or equal to 72°F (22°C) shall have a system for collecting condensate from air-conditioning units with a capacity greater than 65,000 Btu/h (19 kW), and the condensate shall be recovered for re-use.

Recommendation: Adopt

Justification: Needs verification by MEP

IgCC Comparison: very similar requirements

Notes, References, Citations:

SECTION 6 – Water Use Efficiency
2011 ASHRAE 189.1
Analysis with Recommendations

6.3.2.4 Roofs a. The use of potable water for roof spray systems to thermally condition the roof is prohibited. b. The use of potable water for irrigation of vegetated (green) roofs is prohibited once plant material has been established. After the landscape establishment period is completed, the potable water irrigation system shall be removed or permanently disconnected.

Recommendation: Adopt

Justification: Sensible; general proscription of potable water for irrigation is common.

IgCC Comparison: Roof washers required (707.11.9); Roof cooling not mentioned

Notes, References, Citations:

SECTION 6 – Water Use Efficiency
2011 ASHRAE 189.1
Analysis with Recommendations

6.3.3.1 Consumption Management. Measurement devices with remote communication capability shall be provided to collect water consumption data for the domestic water supply to the building. Both potable and reclaimed water entering the building project shall be monitored or submetered. In addition, for individual leased, rented, or other tenant or subtenant space within any building totaling in excess of 50,000 ft² (5000 m² separate submeters shall be provided. For subsystems with multiple similar units, such as multi-cell cooling towers, only one measurement device is required for the subsystem. Any project or building, or tenant or subtenant space within a project or building, such as a commercial car wash or aquarium, shall be submetered where consumption is projected to exceed 1000 gal/day (3800 L/ day). Measurement devices with remote capability shall be provided to collect water use data for each water supply source (e.g., potable water, reclaimed water, rainwater) to the building project that exceeds the thresholds listed in Table 6.3.3A. Utility company service entrance/interval meters are allowed to be used. Provide submetering with remote communication measurement to collect water use data for each of the building subsystems, if such subsystems are sized above the threshold levels listed in Table 6.3.3B.

**TABLE 6.3.3A Water Supply Source
Measurement Thresholds**

Water Source	Main Measurement Threshold
Potable water	1000 gal/day (3800 L/day)
Municipally reclaimed water	1000 gal/day (3800 L/day)
Alternate sources of water	500 gal/day (1900 L/day)

TABLE 6.3.3B Subsystem Water Measurement Thresholds

Subsystem	Sub-Metering Threshold
Cooling towers (meter on makeup water and blowdown)	Cooling tower flow through tower >500 gpm (30 L/s)
Evaporative coolers	Makeup water >0.6 gpm (0.04 L/s)
Steam and hot-water boilers	>500,000 Btu/h (50 kW) input
Total irrigated landscape area with controllers	>25,000 ft ² (2500 m ²)
Separate campus or project buildings	Consumption >1000 gal/day (3800 L/day)
Separately leased or rental space	Consumption >1000 gal/day (3800 L/day)
Any large water using process	Consumption >1000 gal/day (3800 L/day)

Recommendation: Adopt

Justification: Need confirmation of thresholds for meter use – they appear to be reasonable

IgCC Comparison: Metering for "any source associated with the building or building site" is required, no thresholds

Notes, References, Citations:

SECTION 6 – Water Use Efficiency
2011 ASHRAE 189.1
Analysis with Recommendations

6.3.3.2 Consumption Data Collection. All building measurement devices, monitoring systems, and submeters installed to comply with the thresholds limits in Section 6.3.3.1 shall be configured to communicate water consumption data to a meter data management system. At a minimum, meters shall provide daily data and shall record hourly consumption of water.

Recommendation: Sensible, depending on metering thresholds in Table 6.3.3A and B

Justification: Enables performance measurement

IgCC Comparison: Metering for "any source associated with the building or building site" is required, no thresholds. Meters shall be configured to record and transmit data.

Notes, References, Citations:

6.3.3.3 Data Storage and Retrieval. The meter data management system shall be capable of electronically storing water meter, monitoring systems, and submeter data and creating user reports showing calculated hourly, daily, monthly, and annual water consumption for each measurement device and submeter and provide alarming notification capabilities as needed to support the requirements of the Water User Efficiency Plan for Operation in Section 10.3.2.1.2.

Recommendation: Depends on cost – need opinion of MEP

Justification: Performance measurement and (potentially) reporting

IgCC Comparison: Metering for "any source associated with the building or building site" is required, no thresholds. Meters shall be configured to record and transmit data.

Notes, References, Citations:

SECTION 6 – Water Use Efficiency
2011 ASHRAE 189.1
Analysis with Recommendations

6.4.1 Site Water Use Reduction. For golf courses and driving ranges, only municipally reclaimed water and/or alternate on-site sources of water shall be used to irrigate the landscape. For other landscaped areas, a maximum of one-third of improved landscape area is allowed to be irrigated with potable water. The area of dedicated athletic fields shall be excluded from the calculation of the improved landscape for schools, residential common areas, or public recreational facilities. All other irrigation shall be provided from alternate on-site sources of water or municipally reclaimed water.

Exception: Potable water is allowed to be temporarily used on such newly installed landscape for the landscape establishment period. The amount of potable water that may be applied to the newly planted areas during the temporary landscape establishment period shall not exceed 70% of ET_o for turfgrass and 55% of ET_o for other plantings. If municipally-reclaimed water is available at a water main within 200 ft (60 m) of the project site, it shall be used in lieu of potable water during the landscape establishment period. After the landscape establishment period has expired, all irrigation water use shall comply with the requirements established elsewhere in this standard.

Recommendation: Adopt

Justification: Limits Potable water use for irrigation

IgCC Comparison: Mandates gray water for irrigation

Notes, References, Citations:

6.4.2.1 Cooling Towers. The water being discharged from cooling towers for air conditioning systems such as chilled-water systems shall be limited in accordance with method (a) or (b): a. For makeup waters having less than 200 ppm (200 mg/L) of total hardness expressed as calcium carbonate, by achieving a minimum of five cycles of concentration. b. For makeup waters with more than 200 ppm (200 mg/L) of total hardness expressed as calcium carbonate, by achieving a minimum of 3.5 cycles of concentration.

Exception: Where the total dissolved solids concentration of the discharge water exceeds 1500 mg (1500 ppm/L), or the silica exceeds 150 ppm (150 mg/L) measured as silicon dioxide before the above cycles of concentration are reached.

Recommendation: Need MEP advice

Justification:

IgCC Comparison:

Notes, References, Citations:

SECTION 6 – Water Use Efficiency
2011 ASHRAE 189.1
Analysis with Recommendations

6.4.2.2 Commercial Food Service Operations. Commercial food service operations (e.g., restaurants, cafeterias, food preparation kitchens, caterers, etc.): a. shall use high-efficiency pre-rinse spray valves (i.e., valves which function at 1.3 gpm (4.9 L/min) or less and comply with a 26-second performance requirement when tested in accordance with ASTM F2324), b. shall use dishwashers that comply with the requirements of the ENERGY STAR Program for Commercial Dishwashers, c. shall use boilerless/connectionless food steamers that consume no more than 2.0 gal/hour (7.5 L/hour) in the full operational mode, d. shall use combination ovens that consume not more than 10 gal/hour (38 L/hour) in the full operational mode, e. shall use air-cooled ice machines that comply with the requirements of the ENERGY STAR Program for Commercial Ice Machines, and f. shall be equipped with hands-free faucet controllers (foot controllers, sensor-activated, or other) for all faucet fittings within the food preparation area of the kitchen and the dish room, including pot sinks and washing sinks.

Recommendation: Need MEP advice

Justification:

IgCC Comparison:

Notes, References, Citations:

SECTION 6 - Water Use Efficiency
2011 ASHRAE 189.1
Analysis with Recommendations

6.4.2.3 Medical and Laboratory Facilities. Medical and laboratory facilities, including clinics, hospitals, medical centers, physician and dental offices, and medical and non-medical laboratories of all types shall: a. use only water-efficient steam sterilizers equipped with (1) water-tempering devices that allow water to flow only when the discharge of condensate or hot water from the sterilizer exceeds 140°F (60°C) and (2) mechanical vacuum equipment in place of venturi-type vacuum systems for vacuum sterilizers. b. use film processor water recycling units where large frame x-ray films of more than 6 in. (150 mm) in either length or width are processed. Small dental x-ray equipment is exempt from this requirement. c. use digital imaging and radiography systems where the digital networks are installed. d. use a dry-hood scrubber system or, if the applicant determines that a wet-hood scrubber system is required, the scrubber shall be equipped with a water recirculation system. For perchlorate hoods and other applications where a hood wash-down system is required, the hood shall be equipped with self-closing valves on those wash-down systems. e. use only dry vacuum pumps, unless fire and safety codes for explosive, corrosive or oxidative gasses require a liquid ring pump. f. use only efficient water treatment systems that comply with the following criteria: 1. For all filtration processes, pressure gauges shall determine and display when to backwash or change cartridges. 2. For all ion exchange and softening processes, recharge cycles shall be set by volume of water treated or based upon conductivity or hardness. 3. For reverse osmosis and nanofiltration equipment, with capacity greater than 27 gal/h (100 L/h), reject water shall not exceed 60% of the feed water and shall be used as scrubber feed water or for other beneficial uses on the project site. 4. Simple distillation is not acceptable as a means of water purification. g. Food service operations within medical facilities shall comply with Section 6.4.2.2

Recommendation: Need MEP advice

Justification:

IgCC Comparison: Not addressed

Notes, References, Citations:

SECTION 6 – Water Use Efficiency
2011 ASHRAE 189.1
Analysis with Recommendations

6.4.3 Special Water Features. Water use shall comply with the following: a. Ornamental fountains and other ornamental water features shall be supplied either by alternate on-site sources of water or by municipally reclaimed water delivered by the local water utility acceptable to the AHJ. Fountains and other features shall be equipped with: (1) makeup water meters (2) leak detection devices that shut off water flow if a leak of more than 1.0 gal/h (3.8 L/h) is detected, and (3) equipment to recirculate, filter, and treat all water for reuse within the system. **Exception:** Where alternate on-site sources of water or municipally reclaimed water are not available within 500 ft (150 m) of the building project site, potable water is allowed to be used for water features with less than 10,000 gallon (38,000 L) capacity. b. Pools and spas: 1. Backwash water: Recover filter backwash water for reuse on landscaping or other applications, or treat and reuse backwash water within the system. 2. Filtration: For filters with removable cartridges, only reusable cartridges and systems shall be used. For filters with backwash capability, use only pool filter equipment that includes a pressure drop gauge to determine when the filter needs to be backwashed and a sight glass enabling the operator to determine when to stop the backwash cycle. 3. Pool splash troughs, if provided, shall drain back into the pool system.

Recommendation: Do Not Adopt

Justification: Covered in Montgomery County by Public Health Regulations

IgCC Comparison: Not addressed

Notes, References, Citations:

6.5 Performance Option. Calculations shall be done in accordance with generally accepted engineering standards and handbooks acceptable to the AHJ.

Recommendation: Adopt

Justification: Sensible

IgCC Comparison: Such latitude not granted

Notes, References, Citations:

6.5.1 Site Water Use Reduction. Potable water (and municipally reclaimed water, where used) intended to irrigate improved landscape shall be limited to 35% of the water demand for that landscape. The water demand shall be based upon ET for that climatic area and shall not exceed 70% of ET_o for turfgrass areas and 55% of ET_o for all other plant material after adjustment for rainfall.

Recommendation: Need Landscape Architect advice – seems undemanding

Justification: Major objective of all water use reduction standards reduction of use of potable water for uses which can be served by other means.

IgCC Comparison: Not addressed

Notes, References, Citations:

SECTION 6 – Water Use Efficiency
2011 ASHRAE 189.1
Analysis with Recommendations

6.5.2 Building Water Use Reduction. The building project shall be designed to have a total annual interior water use less than or equal to that achieved by compliance with Sections 6.3.2, 6.4.2, and 6.4.3.

Recommendation: Adopt

Justification: Sets total reduction for individual measures

IgCC Comparison: No total consumption calculated in 302.1 or Appendix A

Notes, References, Citations:

SECTION 7 – Energy Efficiency
2011 ASHRAE 189.1
Analysis with Recommendations

2011 – ASHRAE 189.1 Section 7 – Energy Efficiency
Summary:
Analysis and Recommendations
7.1 Scope. This section specifies requirements for energy efficiency for buildings and appliances, for on-site renewable energy systems, and for energy measuring. Recommendation: Adopt Justification: This section is informative only and, by itself, has no adverse effects. IgCC Comparison: - Notes, References, Citations: -
7.2 Compliance. The energy systems shall comply with Section 7.3, "Mandatory Provisions," and either a. Section 7.4, "Prescriptive Option," or b. Section 7.5, "Performance Option." Recommendation: Adopt Justification: This section is informative only and, by itself, has no adverse effects. IgCC Comparison: - Notes, References, Citations: -
7.3.1 General. Building projects shall be designed to comply with Sections 5.4, 6.4, 7.4, 8.4, 9.4, and 10.4 of ANSI/ ASHRAE/IES Standard 90.1. Recommendation: Adopt Justification: Equivalent requirements already exist in the 2012 IECC. IgCC Comparison: - Notes, References, Citations: -

SECTION 7 - Energy Efficiency
2011 ASHRAE 189.1
Analysis with Recommendations

7.3.2 On-Site Renewable Energy Systems. Building project design shall show allocated space and pathways for future installation of on-site renewable energy systems and associated infrastructure that provide the annual energy production equivalent of not less than 6.0 kBtu/ft² (20 kWh/m² for single-story buildings and not less than 10.0 kBtu/ft² (32 kWh/m² multiplied by the total roof area in ft² (m² for all other buildings).

Exceptions: 1. Building projects that have an annual daily average incident solar radiation available to a flat plate collector oriented due south at an angle from horizontal equal to the latitude of the collector location less than 1.2 kBtu/ft²-day (4.0 kWh/m²-day), accounting for existing buildings, permanent infrastructure that is not part of the building project, topography, or trees. 2. Building projects that comply with Section 7.4.1.1.

Recommendation: Do not adopt, but make this requirement optional.

Justification: Although actual costs will vary depending on the actual project, some department of defense studies indicates that this renewable energy requirement could increase construction costs within the county by 4%.

IGCC Comparison: The renewable energy requirements in section 610 are based on a percentage of energy use. This approach emphasizes energy conservation more than market creation.

Notes, References, Citations: Logistics Management Institute in collaboration with Team Integrated Engineering, 2011) "Incremental Cost of Meeting ASHRAE Standard 189.1 at Air force Facilities"

7.3.3.1 Consumption Management. Measurement devices with remote communication capability shall be provided to collect energy consumption data for each energy supply source to the building, including gas, electricity, and district energy, that exceeds the thresholds listed in Table 7.3.3.1A. The measurement devices shall have the capability to automatically communicate the energy consumption data to a data acquisition system. For all buildings that exceed the threshold in Table 7.3.3.1A, subsystem measurement devices with remote capability (including current sensors or flowmeters) shall be provided to measure energy consumption data of each subsystem for each use category that exceeds the thresholds listed in Table 7.3.3.1B. The energy consumption data from the subsystem measurement devices shall be automatically communicated to the data acquisition system.

Recommendation: Adopt with the pre-requisite that either the building already have a building automation system installed or data acquisition is offered by the local utility.

Justification: Requiring sub metering at the given threshold could disproportionately raise the construction costs of small projects

IGCC Comparison: Section 603 in the IGCC is more demanding. This section requires different energy uses of each tenant to be metered separately. This section also requires an energy dashboard that is not required by 189.1.

Notes, References, Citations: -

SECTION 7 - Energy Efficiency
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7.3.3.2 Energy Consumption Data Collection. All building measurement devices shall be configured to automatically communicate the energy data to the data acquisition system. At a minimum, measurement devices shall provide daily data and shall record hourly energy profiles. Such hourly energy profiles shall be capable of being used to assess building performance at least monthly.

Recommendation: Adopt with the pre-requisite that either the building already have a building automation system installed or data acquisition is offered by the local utility.

Justification: Requiring sub metering at the given threshold could disproportionately raise the construction costs of small projects.

IgCC Comparison: Section 603 has the same requirement for data retention.

Notes, References, Citations: -

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7.3.3.3 Data Storage and Retrieval. The data acquisition system shall be capable of electronically storing the data from the measurement devices and other sensing devices, for a minimum of 36 months, and creating user reports showing hourly, daily, monthly, and annual energy consumption. **Exception:** Portions of buildings used as residential

TABLE 7.3.3.1A Energy Source Thresholds

Energy Source	Threshold
Electrical service	>200 kVA
On-site renewable electric power	All systems > 1 kVA (peak)
Gas and district services	>1,000,000 Btu/h (300 kW)
<i>Geothermal</i> energy	>1,000,000 Btu/h (300 kW) heating
On-site renewable thermal energy	>100,000 Btu/h (30 kW)

TABLE 7.3.3.1B System Energy Use Thresholds

Use (Total of All Loads)	Subsystem Threshold
HVAC system	Connected electric load > 100kVA
HVAC system	Connected gas or district services load > 500,000 Btu/h (150 kW)
People moving	Sum of all feeders > 50 kVA
Lighting	Connected load > 50 kVA
Process and plug process	Connected load > 50 kVA Connected gas or district services load > 250,000 Btu/h (75 kW)

Recommendation: Adopt with the pre-requisite that either the building already have a building automation system installed or data acquisition is offered by the local utility.

Justification: Requiring sub metering at the given threshold could disproportionately raise the construction costs of small projects.

IgCC Comparison: These thresholds are more stringent than Section 603, which only requires requiring metering in buildings larger than 25,000 square feet.

Notes, References, Citations: -

7.4.1 General Comprehensive Prescriptive Requirements. When a requirement is provided below, it supersedes the requirement in ANSI/ASHRAE/IES Standard 90.1. For all other criteria, the building project shall comply with the requirements of ANSI/ASHRAE/IES Standard 90.1.

Recommendation: Adopt

Justification: Equivalent requirements already exist in the 2012 IECC.

IgCC Comparison: -

Notes, References, Citations: -

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7.4.1.1 On-Site Renewable Energy Systems. Building projects shall contain on-site renewable energy systems that provide the annual energy production equivalent of not less than 6.0 kBtu/ft² (20 kWh/m² multiplied by the total roof area in ft² (m² for single-story buildings and not less than 10.0 kBtu/ft² (32 kWh/m² multiplied by the total roof area in ft² (m² for all other buildings. The annual energy production shall be the combined sum of all on-site renewable energy systems.

Exception: Buildings that demonstrate compliance with both of the following are not required to contain on-site renewable energy systems: 1. An annual daily average incident solar radiation available to a flat plate collector oriented due south at an angle from horizontal equal to the latitude of the collector location less than 4.0 kWh/m²-day, accounting for existing buildings, permanent infrastructure that is not part of the building project, topography, and trees. 2. A commitment to purchase renewable electricity products complying with the Green-e Energy National Standard for Renewable Electricity Products of at least 7 kWh/ft² (75 kWh/m² of conditioned space each year until the cumulative purchase totals 70 kWh/ft² (750 kWh/m² of conditioned space.

Recommendation: Do not adopt, but make this requirement optional.

Justification: Although actual costs will vary depending on the actual project, some department of defense studies indicates that this renewable energy requirement could increase construction costs within the county by 4%.

IgCC Comparison: The renewable energy requirements in section 610 are based on a percentage of energy use. This approach emphasizes energy conservation instead of market creation.

Notes, References, Citations: Logistics Management Institute in collaboration with Team Integrated Engineering, 2011), "Incremental Cost of Meeting ASHRAE Standard 189.1 at Air force Facilities"

7.4.2 Building Envelope. The building envelope shall comply with Section 5 of ANSI/ASHRAE/IES Standard 90.1 with the following modifications and additions:

Recommendation: Adopt

Justification: Equivalent requirements already exist in the 2012 IECC.

IgCC Comparison: -

Notes, References, Citations: -

7.4.2.1 Building Envelope Requirements. The building envelope shall comply with the requirements in Tables A- 1 to A-8 in Normative Appendix A. These requirements supersede the requirements in Tables 5.5-1 to 5.5-8 of ANSI/ ASHRAE/IES Standard 90.1. **Exception:** Buildings that comply with Section 8.3.4 regardless of building area are exempt from the SHGC criteria for skylights.

Recommendation: Adopt

Justification: This requires only a modest increase in envelope performance over what is already required by the 2012 IECC.

IgCC Comparison: -

Notes, References, Citations: Jaya Mukhopadhyay, Juan-Carlos Baltazar, Ph.D.Hyojin Kim, Jeff S. Haberl, Ph.D., P.E., Cyndi Lewis, Bahman Yazdani, P.E. , (2011), "COMPARISON OF ASHRAE STANDARD 90.1, 189.1 AND IECC CODES FOR LARGE OFFICE BUILDINGS IN TEXAS"

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7.4.2.2 Roof Insulation. Roofs shall comply with the provisions of Section 5.3.2.3 and Tables A-1 to A-8 of this standard. Section 5.5.3.1.1 of ANSI/ASHRAE/IES Standard 90.1 and Table 5.5.3.1 of ANSI/ASHRAE/IES Standard 90.1 shall not apply.

Recommendation: Adopt

Justification: This requires only a modest increase in roof insulation over what is already required by the 2012 IECC.

IgCC Comparison: -

Notes, References, Citations: Jaya Mukhopadhyay, Juan-Carlos Baltazar, Ph.D.Hyojin Kim, Jeff S. Haberl, Ph.D., P.E., Cyndi Lewis, Bahman Yazdani, P.E. , (2011), "COMPARISON OF ASHRAE STANDARD 90.1, 189.1 AND IECC CODES FOR LARGE OFFICE BUILDINGS IN TEXAS"

7.4.2.3 Single-Rafter Roof Insulation. Single-rafter roofs shall comply with the requirements in Table A-9 in Normative Appendix A. These requirements supersede the requirements in Section A2.4.2.4 of ANSI/ASHRAE/IES Standard 90.1. Section A2.4.2.4 and Table A2.4.2 of ANSI/ASHRAE/IES Standard 90.1 shall not apply.

Recommendation: Adopt

Justification: This requires only a modest increase in roof insulation over what is already required by the 2012 IECC.

IgCC Comparison: -

Notes, References, Citations: Jaya Mukhopadhyay, Juan-Carlos Baltazar, Ph.D.Hyojin Kim, Jeff S. Haberl, Ph.D., P.E., Cyndi Lewis, Bahman Yazdani, P.E. , (2011), "COMPARISON OF ASHRAE STANDARD 90.1, 189.1 AND IECC CODES FOR LARGE OFFICE BUILDINGS IN TEXAS"

7.4.2.4 Vertical Fenestration Area. The total vertical fenestration area shall be less than 40% of the gross wall area. This requirement supersedes the requirement in Section 5.5.4.2.1 of ANSI/ASHRAE/IES Standard 90.1.

Recommendation: Do not adopt

Justification: The window to wall ration currently enforced by the 2012 IECC is 30%.

IgCC Comparison: The IGCC requires a 30% window to wall ratio by reference to the IECC.

Notes, References, Citations: -

SECTION 7 – Energy Efficiency
2011 ASHRAE 189.1
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7.4.2.5 Permanent Projections. For climate zones 1- 5, the vertical fenestration on the west, south, and east shall be shaded by permanent projections that have an area-weighted average PF of not less than 0.50. The building is allowed to be rotated up to 45 degrees to the nearest cardinal orientation for purposes of calculations and showing compliance.

Exceptions:

1. Vertical fenestration that receives direct solar radiation for fewer than 250 hours per year because of shading by permanent external buildings, existing permanent infrastructure, or topography.
2. Vertical fenestration with automatically controlled shading devices capable of modulating in multiple steps the amount of solar gain and light transmitted into the space in response to daylight levels or solar intensity that comply with all of the following:
 - a. Exterior shading devices shall be capable of providing at least 90% coverage of the fenestration in the closed position.
 - b. Interior shading devices shall be capable of providing at least 90% coverage of the fenestration in the closed position and have a minimum solar reflectance of 0.50 for the surface facing the fenestration.
 - c. A manual override located in the same enclosed space as the vertical fenestration shall override operation of automatic controls no longer than 4 hours.
 - d. Acceptance testing and commissioning shall be conducted as required by Section 10 to verify that automatic controls for shading devices respond to changes in illumination or radiation intensity.
3. Vertical fenestration with automatically controlled dynamic glazing capable of modulating in multiple steps the amount of solar gain and light transmitted into the space in response to daylight levels or solar intensity that comply with all of the following:
 - a. Dynamic glazing shall have a lower labeled SHGC equal to or less than 0.12, lowest labeled VT no greater than 0.05, and highest labeled VT no less than 0.40.
 - b. A manual override located in the same enclosed space as the vertical fenestration shall override operation of automatic controls no longer than 4 hours.
 - c. Acceptance testing and commissioning shall be conducted as required by Section 10 to verify that automatic controls for dynamic glazing respond to changes in illumination or radiation intensity.

Recommendation: Modify by requiring only compliance with 2012 IECC.

Justification: Replacement will simplify enforcement and make the code adherence easier. Requiring a 10% improvement across the board will increase construction costs and stifle economic growth in the county.

IgCC Comparison: The 2012 IGCC standard has a comparable requirement.

Notes, References, Citations: -

SECTION 7 – Energy Efficiency
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7.4.2.5 Permanent Projections: Climate zones 1–5, permanent projections are req'd on east, west and south elevation fenestration. Exceptions for buildings receiving less than 250 hours of direct sun. Or, exterior or interior shading devices. Or, have dynamic glazing.

Recommendation: Need exception for historic structures undergoing major renovation (those with historic easement protection) And, for forested site locations.

Justification: Focus on proven (even traditional) design, not solely new technology.

Notes, References, Citations: None

7.4.2.6 SHGC of Vertical Fenestration. For SHGC compliance, the methodology in exception (b) to Section 5.5.4.4.1 of ANSI/ASHRAE/IES Standard 90.1 is allowed, provided that the SHGC multipliers in Table 7.4.2.6 are used. This requirement supersedes the requirement in Table 5.5.4.4.1 of ANSI/ASHRAE/IES Standard 90.1. Table 5.5.4.4.1 of ANSI/ASHRAE/IES Standard 90.1 shall not apply. Vertical fenestration that is north-oriented shall be allowed to have a maximum SHGC of 0.10 greater than that specified in Tables A–1 through A–8 in Normative Appendix A. When this exception is utilized, separate calculations shall be performed for these sections of the building envelope, and these values shall not be averaged with any others for compliance purposes.

TABLE 7.4.2.6 SHGC Multipliers for Permanent Projections

<i>PF</i>	<i>SHGC</i> Multiplier (All Other Orientations)	<i>SHGC</i> Multiplier (North-Oriented)
0-0.60	1.00	1.00
>0.60-0.70	0.92	0.96
>0.70-0.80	0.84	0.94
>0.80-0.90	0.77	0.93
>0.90-1.00	0.72	0.90

Recommendation: Adopt

Justification: This requires only a modest increase in solar heat gain coefficients than what is already required by the 2012 IECC.

IgCC Comparison: Section 605.1.1 in the IGCC requires a 10% improvement over the IECC.

Notes, References, Citations: Jaya Mukhopadhyay, Juan-Carlos Baltazar, Ph.D.Hyojin Kim, Jeff S. Haberl, Ph.D., P.E., Cyndi Lewis, Bahman Yazdani, P.E. , (2011), "COMPARISON OF ASHRAE STANDARD 90.1, 189.1 AND IECC CODES FOR LARGE OFFICE BUILDINGS IN TEXAS"

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7.4.2.7 Building Envelope Trade-Off Option. The building envelope trade-off option in Section 5.6 of ANSI/ASHRAE/IES Standard 90.1 shall not apply unless the procedure incorporates the modifications and additions to ANSI/ASHRAE/IES Standard 90.1 noted in Section 7.4.2.

Recommendation: Adopt

Justification: This requires only a modest increase in solar heat gain coefficients than what is already required by the 2012 IECC.

IgCC Comparison: Building envelope trade off option is allowed so long as a 10% improvement over the IECC is realized.

Notes, References, Citations: –

7.4.2.8 Fenestration Orientation. To reduce solar gains from the east and west in climate zones 1 through 4 and from the west in climate zones 5 and 6, the fenestration area and SHGC shall comply with the following requirements: a. For climate zones 1, 2, 3, and 4: (A N SHGC N A S SHGC S) ≥ 1.1 (A E SHGC E A W SHGC W) b. For climate zones 5 and 6: $1/3$ (A N SHGC N A S SHGC S A E SHGC E) ≥ 1.1 (A W SHGC W) where SHGC x the SHGC for orientation x A x fenestration area for orientation x N north (oriented less than 45 degrees of true north) S south (oriented less than 45 degrees of true south) E east (oriented less than or equal to 45 degrees of true east) W west (oriented less than or equal to 45 degrees of true west) **Exceptions:** a. Vertical fenestration that complies with the exception to Section 5.5.4.4.1 (c) of ANSI/ASHRAE/IES Standard 90.1. b. Buildings that have an existing building or existing permanent infrastructure within 20 ft (6 m) to the south or north that is at least half as tall as the proposed building. c. Buildings with shade on 75% of the west- and east-oriented vertical fenestration areas from existing buildings, existing permanent infrastructure, or topography at 9 a.m. and 3 p.m. on the summer solstice. d. Alterations and additions with no increase in vertical fenestration area.

Recommendation: Adopt

Justification: This requires only a modest increase in solar heat gain coefficients than what is already required by the 2012 IECC.

IgCC Comparison: There is no equivalent requirement in the IGCC.

Notes, References, Citations:

7.4.2.9 Continuous Air Barrier. The building envelope shall be designed and constructed with a continuous air barrier that complies with Normative Appendix B to control air leakage into, or out of, the conditioned space. All air barrier components of each envelope assembly shall be clearly identified on construction documents and the joints, interconnections, and penetrations of the air barrier components shall be detailed.

Exception: Building envelopes of semi-heated spaces are except if that the building envelope complies with Section 5.4.3.1 of ANSI/ASHRAE/IES Standard 90.1.

Recommendation: Adopt

Justification: Already required by the 2012 IECC.

IgCC Comparison: Section 605 directly references section C402.4 of the 2012 IECC.

Notes, References, Citations:

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7.4.2.9 Continuous Air Barrier: Must be delineated, detailed thoroughly for all penetrations and clearly identified on all documents, in or out of the conditioned space.

Recommendation: Re write to accommodate additions to historic properties that must be afforded some flexibility to ensure historic envelope integrity.

Justification: Continuous air barriers are necessary to ensure proper performance and longevity of installed systems and equipment. In addition, interior comfort can be maintained more evenly throughout.

Notes, References, Citations: NPS Preservation Briefs 3 and 39.

7.4.3 Heating, Ventilating, and Air Conditioning. The heating, ventilating, and air conditioning shall comply with Section 6 of ANSI/ASHRAE/IES Standard 90.1 with the following modifications and additions.

Recommendation: Adopt

Justification: Equivalent requirements already exist in the 2012 IECC.

IgCC Comparison: -

Notes, References, Citations: -

7.4.3.1 Minimum Equipment Efficiencies. Projects shall comply with one of the following:

- a. EPA baseline. Products shall comply with the minimum efficiencies addressed in the National Appliance Energy Conservation Act (NAECA), Energy Policy Act (EPA), and the Energy Independence and Security Act (EISA).
- b. Higher Efficiency. Products shall comply with the greater of the ENERGY STAR requirements in Section 7.4.7.3 and the values in Normative Appendix
- c. These requirements supersede the requirements in Tables 6.8.1A to 6.8.1G of ANSI/ASHRAE/IES Standard 90.1. The building project shall comply with Sections 7.4.1.1 and 7.4.5.1 with the following modifications:
 1. The on-site renewable energy systems required in Section 7.4.1.1 shall provide an annual energy production of not less than 4.0 kBtu/ft² (13 kWh/m² multiplied by the total roof area in ft² (m² for single-story buildings and not less than 7.0 kBtu/ft² (22 kWh/m² multiplied by the total roof area in ft² (m² for all other buildings).
 2. The peak load reduction systems required in Section 7.4.5.1 shall be capable of reducing electric peak demand by not less than 5% of the projected peak demand.

Recommendation: Adopt

Justification: This requires only a modest increase in efficiency over what is already required by the 2012 IECC.

IgCC Comparison: -

Notes, References, Citations: -

SECTION 7 - Energy Efficiency
2011 ASHRAE 189.1
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7.4.3.2 Ventilation Controls for Densely Occupied Spaces. DCV is required for densely occupied spaces. This requirement supersedes the occupant density threshold in Section 6.4.3.9 of ANSI/ASHRAE/IES Standard 90.1. The DCV system shall be designed to be in compliance with ANSI/ASHRAE Standard 62.1. Occupancy assumptions shall be shown in the design documents for spaces required to have DCV. All CO₂ sensors used as part of a DCV system or any other system that dynamically controls outdoor air shall meet the following requirements: a. Spaces with CO₂ sensors or air sampling probes leading to a central CO₂ monitoring station shall have one sensor or probe for each 10,000 ft² (1000 m²) of floor space and shall be located in the room between 3 and 6 ft (1 and 2 m) above the floor. b. CO₂ sensors must be accurate to ±50 ppm at 1000 ppm. c. Outdoor air CO₂ concentrations shall be determined by one of the following:

1. Outdoor air CO₂ concentrations shall be dynamically measured using a CO₂ sensor located in the path of the outdoor air intake.

2. When documented statistical data are available on the local ambient CO₂ concentrations, a fixed value typical of the location where the building is located shall be allowed in lieu of an outdoor sensor. d. Occupant CO₂ generation rate assumptions shall be shown in the design documents

Recommendation: Adopt

Justification: This is already required by the 2012 IECC

IGCC Comparison: The IGCC has no requirement for demand controlled ventilation

Notes, References, Citations: -

SECTION 7 – Energy Efficiency
2011 ASHRAE 189.1
Analysis with Recommendations

7.4.3.3 Economizers. Systems shall have economizers meeting the requirements in Section 6.5.1 of ANSI/ ASHRAE/IES 90.1 except as noted below.

1. The minimum size requirements for economizers are defined in Table 7.4.3.3 and supersede the requirements in Table 6.5.1 of ANSI/ASHRAE/IES Standard 90.1.
2. Rooftop units with a capacity of less than 60,000 Btu/h (18 kW) shall have two stages of capacity control, with the first stage used for cooling with the economizer and the second stage to add mechanical cooling.
3. For systems that control to a fixed leaving air temperature (i.e., VAV systems), the system shall be capable of resetting the supply air temperature up at least 5°F (3°C) during economizer operation.

Exceptions: All the exceptions in Section 6.5.1 of ANSI/ ASHRAE/IES Standard 90.1 shall apply except as noted below. 1. The use of exception (i) to Section 6.5.1 of ANSI/ ASHRAE/IES Standard 90.1 shall be permitted to eliminate the economizer requirement provided the requirements in Table 6.3.2 of ANSI/ASHRAE/IES Standard 90.1 are applied to the efficiency requirements required by Section 7.4.3.1. 2. For water-cooled units with a capacity less than 54,000 Btu/h (16 kW) that are used in systems where heating and cooling loads are transferred within the building (i.e., water-source heat pump systems), the requirement for an air or water economizer can be eliminated if the condenser-water temperature controls are capable of being set to maintain full load heat rejection capacity down to a 55°F (12°C) condenser-water supply temperature and the HVAC equipment is capable of operating with a 55°F (12°C) condenser-water supply temperature.

TABLE 7.4.3.3 Minimum System Size for Which an Economizer is Required

Climate Zones	Cooling Capacity for Which an Economizer is Required*
1A, 1B	No economizer requirement
2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	≥33,000 Btu/h (9.7 kW) ^d

* Where economizers are required, the total capacity of all systems without economizers shall not exceed 480,000 Btu/h (140 kW) per building or 20% of the building's air economizer capacity, whichever is greater.

Recommendation: Adopt

Justification: This is already required by the 2012 IECC

IgCC Comparison: Section 606.5.1.1 contains similar requirements as both 189.1 and the 2012 IECC.

Notes, References, Citations: –

7.4.3.4 Zone Controls. The exceptions to Section 6.5.2.1 of ANSI/ASHRAE/IES Standard 90.1 shall be modified as follows:

1. **Exception (a)** shall not be used.
2. **Exception (b)1.ii** shall be replaced by the following text: “the design outdoor airflow rate for the zone.”

Recommendation: Adopt

Justification: This requirement will not materially increase the costs of construction.

IgCC Comparison: The IGCC has no equivalent requirement.

Notes, References, Citations: –

SECTION 7 - Energy Efficiency
2011 ASHRAE 189.1
Analysis with Recommendations

7.4.3.5 Fan System Power Limitation. Systems shall have fan power limitations 10% below limitations specified in Table 6.5.3.1.1A of ANSI/ASHRAE/IES Standard 90.1. This requirement supersedes the requirement in Section 6.5.3.1 and Table 6.5.3.1.1A of ANSI/ASHRAE/IES Standard 90.1. All exceptions in Section 6.5.3.1 of ANSI/ASHRAE/IES Standard 90.1 shall apply.

Recommendation: Adopt

Justification: This requirement is comparable to what is already required by the 2012 IECC.

IgCC Comparison: The IGCC introduces a new metric for fan efficiency (the fan efficiency grade) and a direct comparison is not possible.

Notes, References, Citations: -

SECTION 7 – Energy Efficiency
2011 ASHRAE 189.1
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7.4.3.6 Exhaust Air Energy Recovery. The exhaust air energy recovery requirements defined in Section 6.5.6.1 of ANSI/ASHRAE/IES Standard 90.1 shall be used except that the energy recovery effectiveness shall be 60% and the requirements of Table 7.4.3.6 shall be used instead of those of Table 6.5.6.1 of ANSI/ASHRAE/IES Standard 90.1.

TABLE 7.4.3.6 Energy Recovery Requirement (I-P)

Climate Zone	% Outside Air at Full Design Flow							
	≥10% and <20%	≥20% and <30%	≥30% and <40%	≥40% and <50%	≥50% and <60%	≥60% and <70%	≥70% and <80%	≥80%
	Design Supply Fan Flow, cfm							
3B, 3C, 4B, 4C, 5B	NR	NR	NR	NR	NR	NR	≥5000	≥5000
1B, 2B, 5C	NR	NR	NR	NR	≥26,000	≥12,000	≥5000	≥4000
6B	NR	≥22,500	≥11,000	≥5500	≥4500	≥3500	≥2500	≥1500
1A, 2A, 3A, 4A, 5A, 6A	≥30,000	≥13,000	≥5500	≥4500	≥3500	≥2000	≥1000	≥0
7, 8	≥4000	≥3000	≥2500	≥1000	≥0	≥0	≥0	≥0

Recommendation:

TABLE 7.4.3.6 Energy Recovery Requirement (SI)

Climate Zone	% Outside Air at Full Design Flow							
	≥10% and <20%	≥20% and <30%	≥30% and <40%	≥40% and <50%	≥50% and <60%	≥60% and <70%	≥70% and <80%	≥80%
	Design Supply Fan Flow, L/s							
3B, 3C, 4B, 4C, 5B	NR	NR	NR	NR	NR	NR	≥2360	≥2360
1B, 2B, 5C	NR	NR	NR	NR	≥12,271	≥5663	≥2360	≥1888
6B	NR	≥10,619	≥5191	≥2596	≥2124	≥1652	≥1180	≥708
1A, 2A, 3A, 4A, 5A, 6A	≥14,158	≥6135	≥2596	≥2124	≥1652	≥944	≥472	>0
7, 8	≥1888	≥1416	≥1180	≥472	>0	>0	>0	>0

Recommendation: Adopt

Justification: This is already required by the 2012 IECC

IgCC Comparison: Section 606.5.1.1 contains similar requirements as both 189.1 and the 2012 IECC.

Notes, References, Citations: -

SECTION 7 – Energy Efficiency
2011 ASHRAE 189.1
Analysis with Recommendations

7.4.3.7 Variable-Speed Fan Control for Commercial Kitchen Hoods. In addition to the requirements in Section 6.5.7.1 of ANSI/ASHRAE/IES Standard 90.1, commercial kitchen Type I and Type II hood systems shall have variable-speed control for exhaust and makeup air fans to reduce hood airflow rates at least 50% during those times when cooking is not occurring and the cooking appliances are up to temperature in a standby, ready-to-cook mode. All exceptions in Section 6.5.7.1 of ANSI/ASHRAE/IES Standard 90.1 shall apply.

Recommendation: Adopt

Justification: This requirement will not materially increase the costs of construction.

IgCC Comparison: Section 606.7 in the IGCC only applies to systems larger than 5,000 cfm.

Notes, References, Citations: –

7.4.3.8 Duct Insulation. Duct insulation shall comply with the minimum requirements in Tables C-9 and C-10 in Normative Appendix C. These requirements supersede the requirements in Tables 6.8.2A and 6.8.2B of ANSI/ASHRAE/IES Standard 90.1.

Recommendation: Adopt

Justification: This requires only a modest increase in efficiency over what is already required by the 2012 IECC.

IgCC Comparison: Section 606.3 in the IGCC directly references the 2012 IECC.

Notes, References, Citations: –

7.4.3.9 Automatic Control of HVAC and Lights in Hotel/Motel Guest Rooms. In hotels and motels with over 50 guest rooms, the lighting, switched outlets, television, and HVAC equipment serving each guest room shall be automatically controlled such that the power for lighting, switched outlets, and televisions will be turned off within 30 minutes after all occupants leave the guest room and the HVAC set-point raised by at least 5°F (3°C) in the cooling mode and lowered by at least 5°F (3°C) in the heating mode within 30 minutes after all occupants leave the guest room. **Exception:** Guest rooms where the lighting, switched outlets, and televisions are turned off and the HVAC set-points are raised by at least 5°F (3°C) in the cooling mode and lowered by at least 5°F (3°C) in the heating mode when the occupant removes the card from a captive key system.

Recommendation: Adopt

Justification: This requirement will not materially increase the costs of construction.

IgCC Comparison: The IGCC has an identical requirement in Section 608.2.

Notes, References, Citations: –

7.4.4 Service Water Heating. The service water heating shall comply with Section 7 of ANSI/ASHRAE/IES Standard 90.1 with the following modifications and additions.

Recommendation: Adopt

Justification: This requirement is comparable to what is already required by the 2012 IECC.

IgCC Comparison: –

Notes, References, Citations: –

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7.4.4.1 Equipment Efficiency. Equipment shall comply with the minimum efficiencies in Table C-11 in Normative Appendix C. These requirements supersede the requirements in Table 7.8 of ANSI/ASHRAE/IES Standard 90.1.

Recommendation: Adopt

Justification: This requires only a modest increase in efficiency over what is already required by the 2012 IECC.

IgCC Comparison: –

Notes, References, Citations: –

7.4.4.2 Insulation for Spa Pools. Pools heated to more than 90°F (32°C) shall have side and bottom surfaces insulated on the exterior with a minimum insulation value of R-12 (R-2.1).

Recommendation: Adopt

Justification: This requirement will not materially increase the costs of construction.

IgCC Comparison: The IGCC does not have a requirement for insulation.

Notes, References, Citations: –

7.4.5 Power. The power shall comply with Section 8 of ANSI/ASHRAE/IES Standard 90.1 with the following modifications and additions.

Recommendation: Adopt

Justification: This requirement is comparable to what is already required by the 2012 IECC.

IgCC Comparison: –

Notes, References, Citations: –

7.4.5.1 Peak Load Reduction. Building projects shall contain automatic systems, such as demand limiting or load shifting, that are capable of reducing electric peak demand of the building by not less than 10% of the projected peak demand. Standby power generation shall not be used to achieve the reduction in peak demand.

Recommendation: Adopt with the pre-requisite that either the building already have a building automation system installed.

Justification: Requiring automatic peak load reduction for all buildings could disproportionately raise the construction costs of small projects

IgCC Comparison: The IGCC is more demanding by requiring automatic load reduction upon request of the local utility.

Notes, References, Citations: –

7.4.6 Lighting. The lighting shall comply with Section 9 of ANSI/ASHRAE/IES Standard 90.1 and the following modifications and additions.

Recommendation: Adopt

Justification: This requirement is comparable to what is already required by the 2012 IECC.

IgCC Comparison: –

Notes, References, Citations: –

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7.4.6.1 Lighting Power Allowance. The interior lighting power allowance shall be a maximum of the values determined in accordance with Sections 9.5 and 9.6 of ANSI/ASHRAE/IES Standard 90.1 multiplied by an LPD Factor specified in Table 7.4.6.1A for those areas where the Building Area Method is used and in Table 7.4.6.1B for those areas where the Space-by-Space Method is used. Control factors from Table 9.6.2 in ANSI/ASHRAE/IES Standard 90.1 shall not be used for the control methodologies required in this standard. The exterior lighting power allowance shall be a maximum of the values determined in accordance with Sections 9.4.3. of ANSI/ASHRAE/IES Standard 90.1 multiplied by the corresponding factor found in Table 7.4.6.1C. This requirement supersedes the requirements in Sections 9.4.3 of ANSI/ASHRAE/IES Standard 90.1.

**TABLE 7.4.6.1A LPD Factors when
Using the Building Area Method**

Building Area Type	LPD Factor
Courthouse	0.95
Dining—Cafeteria/Fast Food	0.95
Dining—Family	0.95
Dormitory	0.95
Exercise Center	0.95
Healthcare Clinic	0.95
Hospital	0.95
Library	0.95
Multifamily	0.95
Office	0.95
Penitentiary	0.95
Police Station	0.95
Religious Building	0.95
School/University	0.90
Town Hall	0.95
Transportation	0.95
All Other Building Area Types	1.00

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**TABLE 7.4.6.1B LPD Factors when
Using the Space-by-Space Method**

Common Space Type	LPD Factor
Classroom/Lecture/Training	0.85
Conference Meeting/Multipurpose	0.90
Corridor/Transition	0.85
Dining Area	0.90
Dining Area for Family Dining	0.85
Laboratory for Medical/Industrial Research	0.95
Lobby	0.95
Lobby for Elevator	0.85
Lobby for Motion Picture Theater	0.95
Lounge/Recreation	0.85
Office- Enclosed	0.95
Office- Open Plan	0.85
Sales Area	0.95
All Other Common Space Types	1.00
Building-Specific Space Type	LPD Factor
Convention Center- Exhibit Space	0.85
Courthouse - Courtroom	0.85
Fitness Center- Fitness Area	0.85
Gymnasium- Audience Seating/Permanent Seating	0.85
Gymnasium- Fitness Area	0.85
Hospital- Emergency	0.95
Hospital- Exam/Treatment	0.85
Hospital- Laundry/Washing	0.95
Hospital- Lounge/Recreation	0.85
Hospital- Medical Supply	0.90
Hospital- Nursery	0.85
Hospital- Nurses' Station	0.90
Hospital- Patient Room	0.90
Hospital- Physical Therapy	0.85
Library- Card File and Cataloguing	0.90
Library - Stacks	0.95
Manufacturing Facility- High Bay	0.85
Manufacturing Facility - Low Bay	0.85
Motel- Dining Area	0.90
Transportation- Air/Train/Bus - Baggage Area	0.90
Transportation- Airport - Concourse	0.90
Transportation- Terminal- Ticket Counter	0.85
Warehouse- Medium/Bulky Material Storage	0.85
All Other Building-Specific Space Types	1.00

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TABLE 7.4.6.1C Lighting Power Allowance Factors

	Lighting Zone				
	LZ0	LZ1	LZ2	LZ3	LZ4
For Tradable Areas	1.00	0.90	0.90	0.95	0.95
For Nontradable Areas	1.00	0.95	0.95	0.95	0.95

Recommendation: Adopt

Justification: This represents a modest decrease in lighting power and is comparable with what is already required by the 2012 IECC.

IGCC Comparison: The IGCC also requires a comparable reduction in lighting power.

Notes, References, Citations: -

7.4.6.2 Occupancy Sensor Controls with Multi-Level Switching or Dimming. The lighting in the following areas shall be controlled by an occupant sensor with multi-level switching or dimming system that reduces lighting power a minimum of 50% when no persons are present: a. Hallways in multifamily, dormitory, hotel, and motel buildings. b. Commercial and industrial storage stack areas. c. Library stack areas. **Exception:** Areas lit by HID lighting with a lighting power density of 0.8 W/ft² or less.

Recommendation: Adopt

Justification: This requirement is comparable to what is already required by the 2012 IECC.

IGCC Comparison: This requirement is comparable to the IGCC by direct reference to the 2012 IECC.

Notes, References, Citations: -

7.4.6.3 Automatic Controls for Egress and Security Lighting. Lighting in any area within a building that is required to be continuously illuminated for reasons of building security or emergency egress shall not exceed 0.1 W/ft² (1 W/m²). Additional egress and security lighting shall be allowed, provided it is controlled by an automatic control device that turns off the additional lighting.

Recommendation: Adopt

Justification: This requirement is comparable to what is already required by the 2012 IECC.

IGCC Comparison: This requirement is comparable to the IGCC by direct reference to the 2012 IECC.

Notes, References, Citations: -

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7.4.6.4 Occupancy Sensors. Occupancy sensors shall have “manual ON”, “automatic OFF” controls or shall be controlled to automatically turn the lighting on to not more than 50% power, except in the following spaces where full automatic-on is allowed: 1. occupancy sensor controls required in Section 7.4.6.2, 2. public corridors and stairwells, 3. restrooms, 4. primary building entrance areas and lobbies, and 5. areas where manual-on operation would endanger the safety or security of the room or building occupant(s).

Recommendation: Adopt

Justification: This requirement is comparable to what is already required by the 2012 IECC.

IgCC Comparison: This requirement is comparable to the IGCC by direct reference to the 2012 IECC.

Notes, References, Citations: –

7.4.6.5 Controls for Exterior Sign Lighting. All exterior sign lighting, including internally illuminated signs and lighting on externally illuminated signs, shall comply with the requirements of Sections 7.4.6.8.1 or 7.4.6.8.2. **Exceptions:** a. Sign lighting that is specifically required by a health or life safety statute, ordinance, or regulation. b. Signs in tunnels.

Recommendation: Adopt

Justification: This requirement is comparable to what is already required by the 2012 IECC.

IgCC Comparison: This requirement is comparable to section 608.4.2 in the IGCC.

Notes, References, Citations: –

7.4.6.5.1 All sign lighting that operates more than one hour per day during daylight hours shall include controls to automatically reduce the input power to a maximum of 35% of full power for a period from one hour after sunset to one hour before sunrise. **Exception:** Sign lighting using metal halide, high-pressure sodium, induction, cold cathode, or neon lamps that includes controls to automatically reduce the input power to a maximum of 70% of full power for a period from one hour after sunset to one hour before sunrise.

Recommendation: Adopt

Justification: This requirement is comparable to what is already required by the 2012 IECC.

IgCC Comparison: This requirement is comparable to section 608.4.2 in the IGCC.

Notes, References, Citations: –

7.4.6.5.2 All other sign lighting shall include: a. controls to automatically reduce the input power to a maximum of 70% of full power for a period from mid-night or within one hour of the end of business operations, whichever is later, until 6:00 am or business opening, whichever is earlier, and b. controls to automatically turn off during daylight hours.

Recommendation: Adopt

Justification: This requirement is comparable to what is already required by the 2012 IECC.

IgCC Comparison: This requirement is comparable to section 608.4.2 in the IGCC.

Notes, References, Citations: –

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7.4.7 Other Equipment. The other equipment shall comply with Section 10 of ANSI/ASHRAE/IES Standard 90.1 with the following modifications and additions.

Recommendation: Adopt

Justification: This requirement is comparable to what is already required by the 2012 IECC.

IgCC Comparison: -

Notes, References, Citations: -

7.4.7.1 Electric Motors. Motors shall comply with the minimum requirements in Table C-12 in Normative Appendix C. These requirements supersede the requirements in Section 10.4.1 and Table 10.8 of ANSI/ASHRAE/IES Standard 90.1.

Recommendation: Adopt

Justification: This requires only a modest increase in efficiency over what is already required by the 2012 IECC.

IgCC Comparison: The IGCC uses a different metric for motor efficiency and a direct comparison is not possible.

Notes, References, Citations: -

7.4.7.2 Supermarket Heat Recovery. Supermarkets with a floor area of 25,000 ft² (2500 m² or greater shall recover waste heat from the condenser heat rejection on permanently installed refrigeration equipment meeting one of the following criteria: 1. 25% of the refrigeration system full load total heat rejection. 2. 80% of the space heat, service water heating and dehumidification reheat. If a recovery system is used that is installed in the refrigeration system, the system shall not increase the saturated condensing temperature at design conditions by more than 5°F (3°C) and shall not impair other head pressure control/energy reduction strategies.

Recommendation: Do not adopt

Justification: This requirement will materially increase the cost of construction.

IgCC Comparison: There is no corresponding requirement in the IGCC.

Notes, References, Citations: Brian A. Fricke, Ph.D. Oak Ridge National Laboratory Oak Ridge, TN (2011), "Waste Heat Recapture from Supermarket Refrigeration Systems "

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7.4.7.3 ENERGY STAR Equipment. The following equipment within the scope of the applicable ENERGY STAR program shall comply with the equivalent criteria required to achieve the ENERGY STAR label if installed prior to the issuance of the certificate of occupancy:

a. Appliances

1. Clothes washers: ENERGY STAR Program Requirements for Clothes Washers (see also the water efficiency requirements in Section 6.3.2.2)
2. Dehumidifiers: ENERGY STAR Program Requirements for Dehumidifiers
3. Dishwashers: ENERGY STAR Program Requirements Product Specifications for Residential Dishwashers (see also the water efficiency requirements in Section 6.3.2.2)
4. Refrigerators and freezers: ENERGY STAR Program Requirements for Refrigerators and Freezers
5. Room air conditioners: ENERGY STAR Program Requirements and Criteria for Room Air Conditioners (see also the energy efficiency requirements in Section 7.4.1)
6. Room air cleaners: ENERGY STAR Program Requirements for Room Air Cleaners
7. Water coolers: ENERGY STAR Program Requirements for Water Coolers

b. Heating and Cooling

1. Residential air–source heat pumps: ENERGY STAR Program Requirements for ASHPs and Central Air Conditioners (see also the energy efficiency requirements in Section 7.4.1)
2. Residential boilers: ENERGY STAR Program Requirements for Boilers (see also the energy efficiency requirements in Section 7.4.1)
3. Residential central air conditioners: ENERGY STAR Program Requirements for ASHPs and Central Air Conditioners (see also the energy efficiency requirements in Section 7.4.1)
4. Residential ceiling fans: ENERGY STAR Program Requirements for Residential Ceiling Fans
5. Dehumidifiers: ENERGY STAR Program Requirements for Dehumidifiers
6. Programmable thermostats: ENERGY STAR Program Requirements for Programmable Thermostats
7. Ventilating fans: ENERGY STAR Program Requirements for Residential Ventilating Fans
8. Residential warm air furnaces: ENERGY STAR Program Requirements for Furnaces
9. Residential geothermal heat pumps: ENERGY STAR Program Requirements for Geothermal Heat Pumps

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c. Electronics

1. Cordless phones: ENERGY STAR Program Requirements for Telephony
2. Audio and video: ENERGY STAR Program Requirements for Audio and Video
3. Televisions: ENERGY STAR Program Requirements for Televisions
4. Set-top boxes: ENERGY STAR Program Requirements for Set-Top Boxes

d. Office Equipment

1. Computers: ENERGY STAR Program Requirements for Computers
2. Copiers: ENERGY STAR Program Requirements for Imaging Equipment
3. Fax machines: ENERGY STAR Program Requirements for Imaging Equipment
4. Laptops: ENERGY STAR Program Requirements for Computers
5. Mailing machines: ENERGY STAR Program Requirements for Imaging Equipment
6. Monitors: ENERGY STAR Program Requirements for Displays
7. Multifunction devices (printer/fax/scanner): Program Requirements for Imaging Equipment
8. Printers: ENERGY STAR Program Requirements for Imaging Equipment
9. Scanners: ENERGY STAR Program Requirements for Imaging Equipment
10. Computer servers: ENERGY Star Program Requirements for Computer Servers

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e. Water Heaters: ENERGY STAR Program Requirements for Residential Water Heaters

f. Lighting

1. Compact fluorescent light bulbs (CFLs): ENERGY STAR Program Requirements for CFLs
2. Residential light fixtures: ENERGY STAR Program Requirements for Residential Light Fixtures
3. Integral LED lamps: ENERGY STAR Program Requirements for Integral LED Lamps

g. Commercial Food Service

1. Commercial fryers: ENERGY STAR Program Requirements for Commercial Fryers
2. Commercial hot food holding cabinets: ENERGY STAR Program Requirements for Hot Food Holding Cabinets
3. Commercial refrigerators and freezers: ENERGY STAR Program Requirements for Commercial Refrigerators and Freezers
4. Commercial steam cookers: ENERGY STAR Program Requirements for Commercial Steam Cookers (see also water efficiency requirements in Section 6.4.2.2)
5. Commercial ice machines: ENERGY STAR Program Requirements for Commercial Ice Machines
6. Commercial dishwashers: ENERGY STAR Program Requirements for Commercial Dishwashers
7. Commercial griddles: ENERGY STAR Program Requirements for Commercial Griddles
8. Commercial ovens: ENERGY STAR Program Requirements for Commercial Ovens

h. Other Products

1. Battery charging systems: ENERGY STAR Program Requirements for Products with Battery Charger Systems (BCSs)
2. External power adapters: ENERGY STAR Program Requirements for Single-Voltage AC-DC and AC-AC Power Supplies
3. Vending machines: ENERGY STAR Program Requirements for Refrigerated Beverage Vending Machines

Exception: Products with minimum efficiencies addressed in the Energy Policy Act (EPAAct) and the Energy Independence and Security Act (EISA) when complying with Section 7.4.3.1a.

Recommendation: Adopt

Justification: This requirement will not materially increase the cost of construction.

IgCC Comparison: There is no corresponding requirement in the IGCC.

Notes, References, Citations: –

7.4.7.4 Commercial Refrigerators, Freezers, and Clothes Washers a. Commercial refrigerators and freezers shall comply with the minimum efficiencies in Table C-13 in Normative Appendix C. Open refrigerated display cases not covered by strips or curtains are prohibited. Lighting loads, including all power supplies or ballasts, for commercial reach-in refrigerator/freezer display cases shall not exceed 42 watts per door for case doors up to 5 ft (1.5 m) in height and 46 watts per door for case doors greater than 5 ft (1.5 m) in height. b. Commercial clothes washers shall comply with the minimum efficiencies in Table C-14 in Normative Appendix C.

Recommendation: Adopt

Justification: This requirement will not materially increase the cost of construction.

IgCC Comparison: There is no corresponding requirement in the IGCC.

Notes, References, Citations: –

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7.4.8 Energy Cost Budget. The Energy Cost Budget option in Section 11 of ANSI/ASHRAE/IES Standard 90.1 shall not be used.

Recommendation: Adopt

Justification: This section is informative only and, by itself, has no adverse effects. The performance based compliance method is defined in section 7.5.2.

lgCC Comparison: -

Notes, References, Citations: -

7.5.1 General Comprehensive Performance Requirements. Projects shall comply with Sections 7.5.2, 7.5.3, and 7.5.4.

Recommendation: Adopt

Justification: This section is informative only and, by itself, has no adverse effects.

lgCC Comparison: -

Notes, References, Citations: -

7.5.2 Annual Energy Cost. The building project shall have an annual energy cost less than or equal to that achieved by compliance with Sections 7.3 and 7.4, and Sections 5.3.2.2, 5.3.2.3, 6.3.2, 6.4.2, 8.3.1, 8.3.4, and 8.4.1. Comparisons shall be made using Normative Appendix D.

Recommendation: Adopt but modify mandatory sections as noted above.

Justification: This section should be kept in order to allow innovative designs to comply with this standard.

lgCC Comparison: -

Notes, References, Citations: -

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7.5.3 Annual Carbon Dioxide Equivalent (CO₂e). The building project shall have an annual CO₂e less than or equal to that achieved by compliance with Sections 7.3 and 7.4, and Sections 5.3.2.2, 5.3.2.3, 6.3.2, 6.4.2, 8.3.1, 8.3.4, and 8.4.1. Comparisons shall be made using Normative Appendix D provided that the baseline building design is calculated in accordance with Section 7.5.2. To determine the CO₂e value for each energy source supplied to the building project, multiply the energy consumption by the emissions factor. CO₂e emission factors shall be taken from Table 7.5.3.

TABLE 7.5.3 CO₂e Emission Factors

<i>Building Project Energy Source</i>	CO ₂ e lb/kWh (kg/kWh)
Grid delivered electricity and other fuels not specified in this table	1.670 (0.758)
LPG or propane	0.602 (0.274)
Fuel oil (residual)	0.686 (0.312)
Fuel oil (distillate)	0.614 (0.279)
Coal (except lignite)	0.822 (0.373)
Coal (lignite)	1.287 (0.583)
Gasoline	0.681 (0.309)
Natural gas	0.510 (0.232)

Recommendation: Adopt.

Justification: This section should be kept in order to allow innovative designs to comply with this standard.

IqCC Comparison: -

Notes, References, Citations: -

7.5.4 Annual Load Factor/Peak Electric Demand. The building project shall have the same or less peak electric demand than achieved by compliance with Sections 7.3 and 7.4, and Sections 5.3.2.2, 5.3.2.3, 6.3.2, 6.4.2, 8.3.1, 8.3.4, and 8.4.1. Comparisons shall be made using Normative Appendix D provided that the baseline building design is calculated in accordance with Section 7.5.2. In addition, the building project shall have a minimum electrical annual load factor of 0.25.

Recommendation: Adopt.

Justification: This section should be kept in order to allow innovative designs to comply with this standard.

IqCC Comparison: -

Notes, References, Citations: -

SECTION 8 - Indoor Environmental Quality (IEQ)
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2011 - ASHRAE 189.1 Section 8 - Indoor Environmental Quality (IEQ)

Summary:

Analysis and Recommendations

8.1 Scope. This section specifies requirements for indoor environmental quality, including indoor air quality, environmental tobacco smoke control, outdoor air delivery monitoring, thermal comfort, building entrances, acoustic control, daylighting, and low emitting materials.

Recommendation: Maintain as written

Justification: Good practice

IgCC Comparison: Scope is comparable to IgCC 801, but ASHRAE's is more cohesive.

Notes, References, Citations:

8.2 Compliance. The indoor environmental quality shall comply with Section 8.3, "Mandatory Provisions," and either: a. Section 8.4, "Prescriptive Option," or b. Section 8.5, "Performance Option." Daylighting and low-emitting materials are not required to use the same option, i.e., prescriptive or performance, for demonstrating compliance.

Recommendation: Maintain as written.

Justification: Provides instruction regarding use of the standard.

IgCC Comparison: No direct reference.

Notes, References, Citations:

8.3.1 Indoor Air Quality. The building shall comply with Sections 4 through 7 of ANSI/ASHRAE Standard 62.1 with the following modifications and additions. When a requirement is provided below, this supersedes the requirements in ANSI/ASHRAE Standard 62.1.

Recommendation: Maintain as written.

Justification: Provides instruction regarding use of the standard.

IgCC Comparison: No direct reference.

Notes, References, Citations:

8.3.1.1 Minimum Ventilation Rates. The Ventilation Rate Procedure of ANSI/ASHRAE Standard 62.1 shall be used.

Recommendation: Maintain as written.

Justification: Good practice.

IgCC Comparison: None.

Notes, References, Citations:

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8.3.1.2.1 Spaces Ventilated by Mechanical Systems. A permanently mounted, direct total outdoor airflow measurement device shall be provided that is capable of measuring the system minimum outdoor airflow rate. The device shall be capable of measuring flow within an accuracy of $\pm 15\%$ of the minimum outdoor airflow rate. The device shall also be capable of being used to alarm the building operator or for sending a signal to a building central monitoring system when flow rates are not in compliance. **Exception:** Constant volume air supply systems that use a damper position feedback system are not required to have a direct total outdoor airflow measurement device.

Recommendation: Maintain as written.

Justification: Good practice.

IgCC Comparison: None.

Notes, References, Citations:

8.3.1.3 Filtration and Air Cleaner Requirements a. Particulate Matter 1. Wetted Surfaces. Particulate matter filters or air cleaners provided upstream of wetted surfaces in accordance with Section 5.8 of ANSI/ASHRAE Standard 62.1 shall have a MERV of not less than 8. 2. Particulate Matter Smaller than 10 Micrometers (PM10). Particulate matter filters or air cleaners provided to reduce PM10 in outdoor intake in accordance with 6.2.1.1 of ANSI/ASHRAE Standard 62.1 shall have a MERV of not less than 8. 3. Particulate Matter Smaller than 2.5 Micrometers (PM2.5). Particulate matter filters or air cleaners provided to reduce PM2.5 in outdoor intake air in accordance with Section 6.2.1.2 of ANSI/ASHRAE Standard 62.1 shall have a MERV of not less than 13. b. Ozone. In addition to Section 6.2.1.3 of ANSI/ASHRAE Standard 62.1, when the building is located in an area that is designated “non-attainment” with the National Ambient Air Quality Standards for ozone as determined by the AHJ, air-cleaning devices having a removal efficiency of no less than the efficiency specified in Section 6.2.1.3 of ANSI/ASHRAE Standard 62.1 shall be provided to clean outdoor air prior to its introduction to occupied spaces. c. Bypass Pathways. All filter frames, air cleaner racks, access doors, and air cleaner cartridges shall be sealed.

Recommendation: Revise requirement for MERV 13 to MERV 11.

Justification: Good practice, but MERV 13 could be prohibitive for certain projects, mech. system types, stocking costs for more expensive and larger filter.

IgCC Comparison: 803.5 requires MERV 11 with max 0.45 in w.c. pressure drop.

Notes, References, Citations:

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8.3.1.4 Environmental Tobacco Smoke a. Smoking shall not be allowed inside the building. Signage stating such shall be posted within 10 ft (3 m) of each building entrance. b. Any exterior designated smoking areas shall be located a minimum of 25 ft (7.5 m) away from building entrances, outdoor air intakes, and operable windows.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison: Similar in scope to IgCC 803.3.

Notes, References, Citations:

8.3.1.5 Building Entrances. All building entrances shall employ an entry mat system that shall have a scraper surface, an absorption surface, and a finishing surface. Each surface shall be a minimum of the width of the entry opening, and the minimum length is measured in the primary direction of travel.

Exceptions: 1. Entrances to individual dwelling units. 2. Length of entry mat surfaces is allowed to be reduced due to a barrier, such as a counter, partition, or wall, or local regulations prohibiting the use of scraper surfaces outside the entry. In this case entry mat surfaces shall have a minimum length of 3 ft (1 m) of indoor surface, with a minimum combined length of 6 ft (2 m).

Recommendation: Make this section (and 8.3.1.5.1, 8.3.1.5.2, and 8.3.1.5.3) optional.

Justification: This is good practice, but could be prohibitive for small projects and mercantile spaces.

IgCC Comparison: Entry mat requirement is not in IgCC

Notes, References, Citations:

8.3.1.5.1 Scraper Surface. The scraper surface shall comply with the following: a. Shall be the first surface stepped on when entering the building. b. Shall be either immediately outside or inside the entry. c. Shall be a minimum of 3 ft (1 m) long. d. Shall be either permanently mounted grates or removable mats with knobby or squeegee-like projections.

Recommendation: Make this section (and 8.3.1.5, 8.3.1.5.2, and 8.3.1.5.3) optional.

Justification: This is good practice, but could be prohibitive for small projects and mercantile spaces.

IgCC Comparison: Entry mat requirement is not in IgCC

Notes, References, Citations:

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8.3.1.5.2 Absorption Surface. The absorption surface shall comply with the following: a. Shall be the second surface stepped on when entering the building. b. Shall be a minimum of 3 ft (1 m) long, and made from materials that can perform both a scraping action and a moisture wicking action.

Recommendation: Make this section (and 8.3.1.5, 8.3.1.5.1, and 8.3.1.5.3) optional.

Justification: This is good practice, but could be prohibitive for small projects and mercantile spaces.

IgCC Comparison: Entry mat requirement is not in IgCC

Notes, References, Citations:

8.3.1.5.3 Finishing Surface. The finishing surface shall comply with the following: a. Shall be the third surface stepped on when entering the building. b. Shall be a minimum of 4 ft (1.2 m) long, and made from material that will both capture and hold any remaining particles or moisture.

Recommendation: Make this section (and 8.3.1.5, 8.3.1.5.1, and 8.3.1.5.2) optional.

Justification: This is good practice, but could be prohibitive for small projects and mercantile spaces.

IgCC Comparison: Entry mat requirement is not in IgCC

Notes, References, Citations:

8.3.2 Thermal Environmental Conditions for Human Occupancy. The building shall be designed in compliance with ANSI/ASHRAE Standard 55, Sections 6.1, "Design," and 6.2, "Documentation." **Exception:** Spaces with special requirements for processes, activities, or contents that require a thermal environment outside that which humans find thermally acceptable, such as food storage, natatoriums, shower rooms, saunas, and drying rooms.

Recommendation: Make this optional or strike it.

Justification: Good practice, but could be restrictive in HVAC design and budget if a/c and more stringent ventilation is required to meet compliance.

IgCC Comparison: Section 803.2 also requires compliance with ASHRAE 55.

Notes, References, Citations:

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8.3.3.1 Exterior Sound. Wall and roof-ceiling assemblies that are part of the building envelope shall have an OITC rating of 40 or greater or a composite STC rating of 50 or greater, and fenestration that is part of the building envelope shall have an OITC or STC rating of 30 or greater for any of the following conditions: a. Buildings within 1000 ft (300 m) of expressways. b. Buildings within 5 mi (8 km) of airports serving more than 10,000 commercial jets per year. c. Where yearly average day-night average sound levels at the property line exceed 65 decibels.
Exception: Buildings that may have to adhere to functional and operational requirements such as factories, stadiums, storage, enclosed parking structure, and utility buildings.

Recommendation: Make optional this code cycle to generate more comfort with requirements or allow for a narrative explaining why this can't be achieved if not possible due to budget, schedule, etc. As struck through above, eliminate the word "composite" as OITC is by definition not composite.

Justification: Good practice, very important and relevant. However, the potential impacts on design schedule, construction schedule, and budgets (especially for small projects that may not have encountered this before) is restrictive.

IgCC Comparison: Section 807.1/.2 is similar in scope.

Notes, References, Citations:

8.3.3.2 Interior Sound. Interior wall and floor/ceiling assemblies separating interior rooms and spaces shall be designed in accordance with all of the following: a. Wall and floor-ceiling assemblies separating adjacent dwelling units, dwelling units and public spaces, adjacent tenant spaces, tenant spaces and public places, and adjacent classrooms shall have a composite STC rating of 50 or greater. b. Wall and floor-ceiling assemblies separating hotel rooms, motel rooms, and patient rooms in nursing homes and hospitals shall have a composite STC rating of 45 or greater. c. Wall and floor-ceiling assemblies separating classrooms from rest rooms and showers shall have a composite STC rating of 53 or greater. d. Wall and floor-ceiling assemblies separating classrooms from music rooms, mechanical rooms, cafeteria, gymnasiums, and indoor swimming pools shall have a composite STC rating of 60 or greater.

Recommendation: Make optional this code cycle to generate more comfort with requirements or allow for a narrative explaining why this can't be achieved if not possible due to budget, schedule, etc.

In item b., change composite STC 45 for patient rooms in nursing homes and hospitals, to composite STC 50, equaling the IBC.

In item c., make composite STC rating STC 50 as no reference is cited for STC 53.

Justification: Good practice, very important and relevant. However, the potential impacts on design schedule, construction schedule, and budgets (especially for small projects that may not have encountered this before) is restrictive.

IgCC Comparison: Section 807.2.1 is similar in scope.

Notes, References, Citations:

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8.3.3.3 Outdoor–Indoor Transmission Class and Sound Transmission Class. OITC values for assemblies and components shall be determined in accordance with ASTM E1332. STC values for assemblies and components shall be determined in accordance with ASTM E90 and ASTM E413.

Recommendation: Make optional this code cycle to generate more comfort with requirements or allow for a narrative explaining why this can't be achieved if not possible due to budget, schedule, etc.

Justification: Good practice, very important and relevant. However, the potential impacts on design schedule, construction schedule, and budgets (especially for small projects that may not have encountered this before) is restrictive.

IgCC Comparison: Section 807 is more restrictive in it's entirety – also requiring special inspections which ASHRAE 189.1 is not requiring.

Notes, References, Citations:

8.3.4 Daylighting by Toplighting. There shall be a minimum fenestration area providing daylighting by toplighting for large enclosed spaces. In buildings three stories and less above grade, conditioned or unconditioned enclosed spaces that are greater than 20,000 ft² (2000 m²) directly under a roof with finished ceiling heights greater than 15 ft (4 m) and that have a lighting power allowance for general lighting equal to or greater than 0.5 W/ft² (5.5 W/m²) shall comply with the following.

Exceptions: 1. Buildings in climate zones 7 or 8. 2. Auditoria, theaters, museums, places of worship, and refrigerated warehouses.

Recommendation: Make optional.

Justification: Good practice. IgCC will move daylight design from academic research and specialty consulting out into the mainstream of standard architectural practice. But it will influence or make more critical various design and cost issues related to building form, floor plan geometries, orientation, amount of fenestration, shading and etc. It will require from architects more innovation and technical design skills to minimize cost implications.

The new requirement will result in dramatic changes required for the new built environment and should be introduced gradually. It may not make sense for other uses including retail.

IgCC Comparison: Refer to Section 808 for individual references.

Notes, References, Citations: LEED–NC/S 2009 IEQc8.1 has some basic requirements that have been utilized for years, but since it's optional, not everyone can or will comply

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8.3.4.1 Minimum Daylight Area by Toplighting. A minimum of 50% of the floor area directly under a roof in spaces with a lighting power density or lighting power allowance greater than 0.5 W/ft² (5 W/m²) shall be in the daylight area. Areas that are daylit shall have a minimum toplighting area to daylight area ratio as shown in Table 8.3.4.1. For purposes of compliance with Table 8.3.4.1, the greater of the space lighting power density and the space lighting power allowance shall be used.

TABLE 8.3.4.1 Minimum Toplighting Area

Lighting Power Density or Lighting Power Allowances in Daylight Area, W/ft ² (W/m ²)	Minimum Toplighting Area to Daylight Area Ratio
1.4 W/ft ² (14 W/m ²) < LPD	3.6%
1.0 W/ft ² (10 W/m ²) < LPD < 1.4 W/ft ² (14 W/m ²)	3.3%
0.5 W/ft ² (5 W/m ²) < LPD < 1.0 W/ft ² (10 W/m ²)	3.0%

Recommendation: Make optional. Or Daylight autonomy based on occupancy from 6 am till 8 pm and calculated for a minimum 28 foot-candles (300 lux) lighting level at 30 inches (750mm) above the floor shall be not less than 50%.

Justification: Good practice. IgCC will move daylight design from academic research and specialty consulting out into the mainstream of standard architectural practice. But it will influence or make more critical various design and cost issues related to building form, floor plan geometries, orientation, amount of fenestration, shading and etc. It will require from architects more innovation and technical design skills to minimize cost implications.

The new requirement will result in dramatic changes required for the new built environment and should be introduced gradually. It may not make sense for other uses including retail.

IgCC Comparison: Refer to Section 808 for individual references.

Notes, References, Citations: LEED-NC/S 2009 IEQc8.1 has some basic requirements that have been utilized for years, but since it's optional, not everyone can or will comply

8.3.4.2 Skylight Characteristics. Skylights used to comply with Section 8.3.4.1 shall have a glazing material or diffuser that has a measured haze value greater than 90%, tested according to ASTM D1003 (notwithstanding its scope) or other test method approved by the AHJ. **Exceptions:** 1. Skylights with a measured haze value less than or equal to 90% whose combined area does not exceed 5% of the total skylight area. 2. Tubular daylighting devices having a diffuser. 3. Skylights that are capable of preventing direct sunlight from entering the occupied space below the well during occupied hours. This shall be accomplished using one or more of the following: a. orientation b. automated shading or diffusing devices c. diffusers d. fixed internal or external baffles 4. Airline terminals, convention centers, and shopping malls.

Recommendation: Maintain as written.

Justification: Good practice for all skylights.

IgCC Comparison: Refer to Section 808 for individual references.

Notes, References, Citations: LEED-NC/S 2009 IEQc8.1 has some basic requirements that have been utilized for years, but since it's optional, not everyone can or will comply

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8.3.5 Isolation of the Building from Pollutants in Soil. Building projects that include construction or expansion of a ground-level foundation and which are located on brownfield sites or in “Zone 1” counties identified to have a significant probability of radon concentrations higher than 4 picocuries/ liter on the USEPA map of radon zones, shall have a soil gas retarding system installed between the newly constructed space and the soil.

Recommendation: Delete.

Justification: State environmental and EPA regulations govern these instances.

IgCC Comparison:

Notes, References, Citations:

8.4.1.1 Minimum Sidelighting Effective Aperture. Office spaces and classrooms shall comply with the following criteria: a. All north-, south-, and east-facing facades for those spaces shall have a minimum sidelighting effective aperture as prescribed in Table 8.4.1.1. b. The combined width of the primary sidelighted areas shall be at least 75% of the length of the façade wall. c. Opaque interior surfaces in daylight areas shall have visible light reflectances greater than or equal to 80% for ceilings and 70% for partitions higher than 60 in. (1.8 m) in daylight areas.

Exceptions: 1. Spaces with programming that requires dark conditions (e.g., photographic processing). 2. Spaces with toplighting in compliance with Section 8.3.4. 3. Daylight areas where the height of existing adjacent structures above the window is at least twice the distance between the window and the adjacent structures, measured from the top of the glazing.

**TABLE 8.4.1.1 Minimum Sidelighting
Effective Aperture**

Climate Zone	Minimum Sidelighting Effective Aperture
1, 2, 3A, 3B	0.10
3C, 4, 5, 6, 7, 8	0.15

Recommendation: Make optional. Or Daylight autonomy based on occupancy from 6 am till 8 pm and calculated for a minimum 28 foot-candles (300 lux) lighting level at 30 inches (750mm) above the floor shall be not less than 50%.

Justification: Good practice. IgCC will move daylight design from academic research and specialty consulting out into the mainstream of standard architectural practice. But it will influence or make more critical various design and cost issues related to building form, floor plan geometries, orientation, amount of fenestration, shading and etc. It will require from architects more innovation and technical design skills to minimize cost implications.

The new requirement will result in dramatic changes required for the new build environment and should be introduced gradually.

IgCC Comparison: Refer to Section 808 for individual references.

Notes, References, Citations: LEED-NC/S 2009 IEQc8.1 has some basic requirements that have been utilized for years, but since it’s optional, not everyone can or will comply

SECTION 8 – Indoor Environmental Quality (IEQ)
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8.4.1.2 Office Space Shading. Each west-, south-, and east-facing facade, shall be designed with a shading PF. The PF shall be not less than 0.5. Shading is allowed to be external or internal using the interior PF. The building is allowed to be rotated up to 45 degrees for purposes of calculations and showing compliance. The following shading devices are allowed to be used: a. Louvers, sun shades, light shelves, and any other permanent device. Any vertical fenestration that employs a combination of interior and external shading is allowed to be separated into multiple segments for compliance purposes. Each segment shall comply with the requirements for either external or interior projection factor. b. Building self-shading through roof overhangs or recessed windows.

Exceptions: 1. Translucent panels and glazing systems with a measured haze value greater than 90%, tested according to ASTM D1003 (notwithstanding its scope) or other test method approved by the AHJ, and that are entirely 8 ft (2.5 m) above the floor, do not require external shading devices. 2. Vertical fenestration that receives direct solar radiation for less than 250 hours per year because of shading by permanent external buildings, existing permanent infrastructure, or topography. 3. Vertical fenestration with automatically controlled shading devices in compliance with **Exception 2 of Section 7.4.2.5**. 4. Vertical fenestration with automatically controlled dynamic glazing in compliance with **Exception 3 of Section 7.4.2.5**.

Recommendation: Make optional.

Allow compliance for requirements listed 8.4.1.2, 8.3.4.1, 8.4.1.1, 8.5.1.2 Direct Sun Limitation on Work surfaces in Offices, 8.5.1.1 Usable IL luminance in Office Spaces and Classrooms by demonstrating that performance balance between daylight, glare and external shading was achieved through computer simulations and evolutionary computing.

Justification:

Office Space Shading, 8.5.1.2 Direct Sun Limitation on Work surfaces in Offices, 8.5.1.1 Usable IL luminance in Office Spaces and Classrooms may be in conflict with each other. Designer may be able achieve one requirement but violate another in the process. The goal of maximizing daylight may be in conflict with specific requirement for shading and direct sun light limit. Best design solutions are typically balancing various competing goals. Today designers have available technology which allows optimization and balance of various performances.

IgCC Comparison: Refer to Section 808 for individual references.

Notes, References, Citations: LEED-NC/S 2009 IEQc8.1 has some basic requirements that have been utilized for years, but since it's optional, not everyone can or will comply

SECTION 8 – Indoor Environmental Quality (IEQ)
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8.4.2 Materials. Reported emissions or VOC contents specified below shall be from a representative product sample and conducted with each product reformulation or at a minimum of every three years. Products certified under third-party certification programs as meeting the specific emission or VOC content requirements listed below are exempted from this three-year testing requirement but shall meet all the other requirements as listed below.

Recommendation: Maintain as written.

Justification: Good practice.

IgCC Comparison:

Notes, References, Citations:

8.4.2.1 Adhesives and Sealants. Products in this category include carpet, resilient, and wood flooring adhesives; base cove adhesives; ceramic tile adhesives; drywall and panel adhesives; aerosol adhesives; adhesive primers; acoustical sealants; firestop sealants; HVAC air duct sealants, sealant primers; and caulks. All adhesives and sealants used on the interior of the building (defined as inside of the weather-proofing system and applied on-site) shall comply with the requirements of either Section 8.4.2.1.1 or 8.4.2.1.2:

Recommendation: Maintain as written.

Justification: Good practice.

IgCC Comparison: similar in scope to Section 806.2 which only requires 85% compliance by weight or volume.

Notes, References, Citations: Optional credit in LEED-NC (and other reference guides) v2009.

8.4.2.1.1 Emissions Requirements. Emissions shall be determined according to CDPH/EHLB/ Standard Method V1.1 (commonly referred to as California Section 01350) and shall comply with the limit requirements for either office or classroom spaces regardless of the space type.

Recommendation: Maintain as written.

Justification: Good practice.

IgCC Comparison:

Notes, References, Citations:

SECTION 8 - Indoor Environmental Quality (IEQ)

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Analysis with Recommendations

8.4.2.1.2 VOC Content Requirements. VOC content shall comply with and shall be determined according to the following limit requirements: a. Adhesives, sealants and sealant primers: SCAQMD Rule 1168. HVAC duct sealants shall be classified as "Other" category within the SCAQMD Rule 1168 sealants table. b. Aerosol adhesives: Green Seal Standard GS-36. Exceptions: The following solvent welding and sealant products are not required to meet the emissions or the VOC content requirements listed above. 1. Cleaners, solvent cements, and primers used with plastic piping and conduit in plumbing, fire suppression, and electrical systems. 2. HVAC air duct sealants when the air temperature of the space in which they are applied is less than 40°F (4.5°C).

Recommendation: Maintain as written.

Justification: Good practice.

IgCC Comparison:

Notes, References, Citations:

8.4.2.2 Paints and Coatings. Products in this category include sealers, stains, clear wood finishes, floor sealers and coatings, waterproofing sealers, primers, flat paints and coatings, non-flat paints and coatings, and rust-preventative coatings. Paints and coatings used on the interior of the building (defined as inside of the weatherproofing system and applied on-site) shall comply with either Section 8.4.2.2.1 or 8.4.2.2.2.

Recommendation: Maintain as written.

Justification: Good practice.

IgCC Comparison: Section 806.3 only requires 85% compliance by weight or volume.

Notes, References, Citations: Optional credit in LEED-NC (and other reference guides) v2009.

8.4.2.2.1 Emissions Requirements. Emissions shall be determined according to CDPH/EHLB/ Standard Method V1.1 (commonly referred to as California Section 01350) and shall comply with the limit requirements for either office or classroom spaces regardless of the space type.

Recommendation: Maintain as written.

Justification: Good practice.

IgCC Comparison:

Notes, References, Citations:

SECTION 8 - Indoor Environmental Quality (IEQ)
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Analysis with Recommendations

8.4.2.2.2 VOC Content Requirements. VOC content shall comply with and be determined according to the following limit requirements: a. Architectural paints, coatings and primers applied to interior surfaces: Green Seal Standard GS-11. b. Clear wood finishes, floor coatings, stains, sealers, and shellacs: SCAQMD Rule 1113.

Recommendation: Maintain as written.

Justification: Good practice.

IgCC Comparison:

Notes, References, Citations:

8.4.2.3 Floor Covering Materials. Floor covering materials installed in the building interior shall comply with the following: a. Carpet: Carpet shall be tested in accordance with and shown to be compliant with the requirements of CDPH/ EHLB/Standard Method V1.1 (commonly referred to as California Section 01350). Products that have been verified and labeled to be in compliance with Section 9 of CDPH/EHLB/Standard Method V1.1 (commonly referred to as California Section 01350) comply with this requirement. b. Hard surface flooring in office spaces and classrooms: Materials shall be tested in accordance with and shown to be compliant with the requirements of CDPH/EHLB/ Standard Method V1.1 (commonly referred to as California Section 01350).

Recommendation: Maintain as written.

Justification: Good practice.

IgCC Comparison: Section 806.4 only requires 85% compliance by weight or volume.

Notes, References, Citations: Optional credit in LEED-NC (and other reference guides) v2009.

SECTION 8 – Indoor Environmental Quality (IEQ)
2011 ASHRAE 189.1
Analysis with Recommendations

8.4.2.4 Composite Wood, Wood Structural Panel and Agrifiber Products. Composite wood, wood structural panel, and agrifiber products used on the interior of the building (defined as inside of the weatherproofing system) shall contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins. Composite wood and agrifiber products are defined as: particleboard, medium density fiberboard (MDF), wheatboard, strawboard, panel substrates, and door cores. Materials considered furniture, fixtures and equipment (FF&E) are not considered base building elements and are not included in this requirement. Emissions for products covered by this section shall be determined according to and shall comply with one of the following: a. Third-party certification shall be submitted indicating compliance with the California Air Resource Board's (CARB) regulation, Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products. Third-party certifier shall be approved by CARB. b. CDPH/EHLB/Standard Method V1.1 (commonly referred to as California Section 01350) and shall comply with the limit requirements for either office or classroom spaces regardless of the space type. **Exception:** Structural panel components such as plywood, particle board, wafer board, and oriented strand board identified as "EXPOSURE 1," "EXTERIOR," or "HUD-APPROVED" are considered acceptable for interior use.

Recommendation: Strike or make optional.

Justification: EPA may be regulating this in the near future and it could be cost-prohibitive as all products are not yet readily available in the market.

IgCC Comparison: Similar in scope to Section 806.1.

Notes, References, Citations:

8.4.2.5 Office Furniture Systems and Seating. All office furniture systems and seating installed prior to occupancy shall be tested according to ANSI/BIFMA M7.1 and shall not exceed the limit requirements listed in Normative Appendix E of this standard.

Recommendation: Make optional.

Justification: Good practice, but could be cost prohibitive for some smaller projects due to purchasing opportunities. Also doesn't exclude salvaged or recycled/reused furniture. Not practical, difficult to administer and overreaching.

IgCC Comparison: Not included.

Notes, References, Citations: Not a commonly-achieved optional credit in LEED v. 2009

SECTION 8 – Indoor Environmental Quality (IEQ)
2011 ASHRAE 189.1
Analysis with Recommendations

8.4.2.6 Ceiling and Wall Systems. These systems include ceiling and wall insulation, acoustical ceiling panels, tackable wall panels, gypsum wall board and panels, and wall coverings. Emissions for these products shall be determined according to CDPH/EHLB/Standard Method V1.1 (commonly referred to as California Section 01350) and shall comply with the limit requirements for either office or classroom spaces regardless of the space type.

Recommendation: Maintain as written.

Justification: Good practice.

IGCC Comparison: Section 806.5 is similar, but only requires 85% compliance by weight or volume.

Notes, References, Citations: Optional credit in LEED, v2009.

SECTION 8 – Indoor Environmental Quality (IEQ)
2011 ASHRAE 189.1
Analysis with Recommendations

8.5.1.1 Usable Illuminance in Office Spaces and Classrooms. The design for the building project shall demonstrate an illuminance of at least 30 fc (300 lux) on a plane 2.5 ft (0.8 m) above the floor, within 75% of the area of the daylight area. The simulation shall be made at noon on the equinox using an accurate physical model or computer daylighting model.

a. Computer models shall be built using daylight simulation software based on the ray-tracing or radiosity methodology. b. Simulation shall be done using either the CIE Overcast Sky Model or the CIE Clear Sky Model.

Exception: Where the simulation demonstrates that existing adjacent structures preclude meeting the illuminance requirements.

Recommendation: Make optional. Or Daylight autonomy based on occupancy from 6 am till 8 pm and calculated for a minimum 28 foot-candles (300 lux) lighting level at 30 inches (750mm) above the floor shall be not less than 50%.

Allow compliance for requirements listed 8.4.1.2, 8.3.4.1, 8.4.1.1, 8.5.1.2 Direct Sun Limitation on Work surfaces in Offices, 8.5.1.1 Usable IL luminance in Office Spaces and Classrooms by demonstrating that performance balance between daylight, glare and external shading was achieved through computer simulations and evolutionary computing.

Justification: Good practice. IgCC will move daylight design from academic research and specialty consulting out into the mainstream of standard architectural practice. But it will influence or make more critical various design and cost issues related to building form, floor plan geometries, orientation, amount of fenestration, shading and etc. It will require from architects more innovation and technical design skills to minimize cost implications.

The new requirement will result in dramatic changes required for the new build environment and should be introduced gradually.

Office Space Shading, 8.5.1.2 Direct Sun Limitation on Work surfaces in Offices, 8.5.1.1 Usable IL luminance in Office Spaces and Classrooms may be in conflict with each other.

Designer may be able achieve one requirement but violate another in the process.

The goal of maximizing daylight may be in conflict with specific requirement for shading and direct sun light limit. Best design solutions are typically balancing various competing goals.

Today designers have available technology which allows optimization and balance of various performances.

IgCC Comparison: Refer to Section 808 for individual references.

Notes, References, Citations: LEED-NC/S 2009 IEQc8.1 has some basic requirements that have been utilized for years, but since it's optional, not everyone can or will comply

SECTION 8 - Indoor Environmental Quality (IEQ)

2011 ASHRAE 189.1

Analysis with Recommendations

8.5.1.2 Direct Sun Limitation on Worksurfaces in Offices. It shall be demonstrated that direct sun does not strike anywhere on a worksurface in any daylit space for more than 20% of the occupied hours during an equinox day in regularly occupied office spaces. If the worksurface height is not defined, a height of 2.5 ft (0.75 m) above the floor shall be used.

Recommendation: Strike

Justification: It seems that this paragraph is an attempt to address glare. While glare is a subject of current active academic research - currently it is not possible simulate glare effects with high accuracy.

Typically when people experience glare they will close window blinds (either manually or automatically) - but 8.5.1.2 text does not take this fact into account.

We do agree with the intent that glare should be controlled. But we disagree that required simulations of direct sun light will provide accurate design data because it does not require take into account blinds, shading devices, human ability to move and adjust position of the human body in space etc...

This requirement is unnecessarily complicated.

IGCC Comparison: Refer to Section 808 for individual references.

Notes, References, Citations: LEED-NC/S 2009 IEQc8.1 has some basic requirements that have been utilized for years, but since it's optional, not everyone can or will comply

SECTION 8 – Indoor Environmental Quality (IEQ)

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Analysis with Recommendations

8.5.2 Materials. The emissions of all the materials listed below and used within the building (defined as inside of the weatherproofing system and applied onsite) shall be modeled for individual VOC concentrations. The sum of each individual VOC concentration from the materials listed below shall be shown to be in compliance with the limits as listed in Section 4.3 of the CDPH/EHLB/Standard Method V1.1 (commonly referred to as California Section 01350) and shall be compared to 100% of its corresponding listed limit. In addition, the modeling for the building shall include at a minimum the criteria listed in Normative Appendix F. Emissions of materials used for modeling VOC concentrations shall be obtained in accordance with the testing procedures of CDPH/EHLB/Standard Method V1.1 (commonly referred to as California Section 01350) unless otherwise noted below. c. Rigid panel products, including gypsum board, other wall paneling, insulation board, oriented strand board, medium density fiber board, wood structural panel, acoustical ceiling tiles, and particleboard. d. Insulation products. e. Containerized products, including adhesives, sealants, paints, other coatings, primers, and other “wet” products. f. Cabinets, shelves, and worksurfaces that are permanently attached to the building before occupancy. Emissions of these items shall be obtained in accordance with the ANSI/BIFMA M7.1. g. Office furniture systems and seating installed prior to initial occupancy. Emissions of these items shall be obtained in accordance with the ANSI/BIFMA M7.1. a. Tile, strip, panel, and plank products, including vinyl composition tile, resilient floor tile, linoleum tile, wood floor strips, parquet flooring, laminated flooring, and modular carpet tile. b. Sheet and roll goods, including broadloom carpet, sheet vinyl, sheet linoleum, carpet cushion, wallcovering, and other fabric.

Exception: Salvaged materials that have not been refurbished or refinished within one year prior to installation.

Recommendation: Make optional or strike

Justification: Total VOC summation could be prohibitive or cause hardship to some projects, especially smaller or first-time sustainable builders. This is good practice and relevant and should be incorporated as required into the next adoption cycle.

IgCC Comparison: Similar in scope to A108.5 Total VOC limit which is an Appendix A Project Elective.

Notes, References, Citations:

SECTION 9 – The Buildings Impact on Atmosphere, Materials and Resources
2011 ASHRAE 189.1
Analysis with Recommendations

2011 – ASHRAE 189.1 – Section 9 – The Buildings Impact on Atmosphere, Materials and Resources

Summary: This 2 page section deals with waste management and materials selection

Analysis and Recommendations

9.1 Scope. This section specifies requirements for the building's impact on the atmosphere, materials, and resources, including construction waste management, refrigerants, storage and collection of recyclables, and reduced impact materials.

Recommendation: Adopt

Justification: Requirements generally reasonable

IgCC Comparison: 2 pages also; complicated by Table 302.1, Appendix A

Notes, References, Citations:

9.2 Compliance. The building materials shall comply with Section 9.3, "Mandatory Provisions," and either a. Section 9.4, "Prescriptive Option," or b. Section 9.5, "Performance Option."

Recommendation: Adopt as mandatory

Justification: 2 compliance paths typical of ASHRAE codes, uncomplicated, gives flexibility

IgCC Comparison:

Notes, References, Citations:

9.3.1.1 Diversion. A minimum of 50% of nonhazardous construction and demolition waste material generated prior to the issuance of the final certificate of occupancy shall be diverted from disposal in landfills and incinerators by recycling and/or reuse. Reuse includes donation of materials to charitable organizations, salvage of existing materials onsite, and packaging materials returned to the manufacturer, shipper, or other source that will reuse the packaging in future shipments. Excavated soil and land-clearing debris shall not be included in the calculation. Calculations are allowed to be done by either weight or volume, but shall be consistent throughout. Specific area(s) on the construction site shall be designated for collection of recyclable and reusable materials. Off-site storage and sorting of materials shall be allowed. Diversion efforts shall be tracked throughout the construction process.

Recommendation: Adopt

Justification: 50% easily achievable

IgCC Comparison: 50% is minimum

Notes, References, Citations:

SECTION 9 - The Buildings Impact on Atmosphere, Materials and Resources
2011 ASHRAE 189.1
Analysis with Recommendations

9.3.1.2 Total Waste. For new building projects on sites with less than 5% existing buildings, structures or hardscape, the total amount of construction waste generated prior to the issuance of the final certificate of occupancy on the project shall not exceed 42 yd³ or 12,000 lbs per 10,000 ft² (35 m³ or 6000 kg per 1000 m² of new building floor area. This shall apply to all waste whether diverted, landfilled, incinerated, or otherwise disposed of. Excavated soil and land-clearing debris shall not be included in the calculation. The amount of waste shall be tracked throughout the construction process.

Recommendation: Adopt; limit on total waste makes sense; do the numbers make sense? How do these numbers compare with 9.3.1.1?

Justification: Incentives to reduce the waste stream are important and universal.

IgCC Comparison:

Notes, References, Citations:

9.3.2 Extracting, Harvesting, and/or Manufacturing. This section applies to all materials, products, and/or assemblies installed prior to the issuance of the final certificate of occupancy. Materials shall be harvested and/or extracted and products and/or assemblies shall be manufactured according to the laws and regulations of the country of origin. Wood products in the project, other than recovered or reused wood, shall not contain wood from endangered wood species unless the trade of such wood conforms with the requirements of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Recommendation: Delay

Justification: Not clear such information is widely available

IgCC Comparison:

Notes, References, Citations:

9.3.3 Refrigerants. CFC-based refrigerants in HVAC&R systems shall not be used. Fire suppression systems shall not contain ozone-depleting substances (CFCs, HCFCs, or Halons).

Recommendation: Adopt although redundant;

Justification: These substances are forbidden by The Montreal Protocols

IgCC Comparison:

Notes, References, Citations:

SECTION 9 – The Buildings Impact on Atmosphere, Materials and Resources
2011 ASHRAE 189.1
Analysis with Recommendations

9.3.4.1 Recyclables. There shall be an area that serves the entire building and is dedicated to the collection and storage of non-hazardous materials for recycling, including paper, corrugated cardboard, glass, plastics, and metals. The size and functionality of the recycling areas shall be coordinated with the anticipated collection services to maximize the effectiveness of the dedicated areas.

Recommendation: Redundant – Required by Montgomery County

Justification:

IgCC Comparison:

Notes, References, Citations:

9.3.4.2 Reusable goods. For building projects with residential spaces, there shall be an area that serves the entire building and is designed for the collection and storage of discarded but clean items in good condition. Charitable organizations or others to arrange for periodic pickups shall be identified and posted.

Recommendation: Necessary? Burdensome?

Justification:

IgCC Comparison:

Notes, References, Citations:

9.3.4.2 Reusable Goods: Buildings that contain residential components shall have space dedicated to store discarded items. This space is for charitable organization pick up.

Recommendation: Opt to revise this as an optional compliance provision, not mandatory. And/or, allow flexibility in the assignment of spaces to serve this purpose.

Justification: Unlike recyclables, donation items may present unique hazards that cannot be foreseen, as such, this space could require special hazard designation by the AHJ. In addition, this space might present peculiar programming conflicts with standard loading areas depending on scope/size of the project.

Notes, References, Citations: None

9.3.4.3 Fluorescent and HID Lamps and Ballasts. An area shall be provided that serves the entire building and is designed for the collection and storage of fluorescent and HID lamps and ballasts and facilitates proper disposal and/or recycling according to state and local hazardous waste requirements.

Recommendation: Necessary? Burdensome?

Justification:

IgCC Comparison:

Notes, References, Citations:

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9.4.1 Reduced Impact Materials. The building project shall contain materials that comply with Section 9.4.1.1, 9.4.1.2, or 9.4.1.3. Components of mechanical, electrical, plumbing, fire safety systems, and transportation devices shall not be included in the calculations except for piping, plumbing fixtures, ductwork, conduit, wiring, cabling, and elevator and escalator framing. Calculations shall only include materials permanently installed in the project. A value of 45% of the total construction cost is allowed to be used in lieu of the actual total cost of materials.

Recommendation: Adopt after considering individual or collective (IgCC) accounting

Justification: Generally good practice to encourage the use of such materials.

IgCC Comparison: 55% or more required for categories 9.4.1.1, 2 and 3 totaled.

Notes, References, Citations:

9.4.1.1 Recycled Content. The sum of post-consumer recycled content plus one-half of the pre-consumer recycled content shall constitute a minimum of 10%, based on cost, of the total materials in the building project. The recycled content of a material shall be determined by weight. The recycled fraction of the material in an assembly shall then be multiplied by the cost of assembly to determine its contribution to the 10% requirement. The annual average industry values, by country of production, for the recycled content of steel products manufactured in basic oxygen furnaces and electric arc furnaces are allowed to be used as the recycled content of the steel. For the purpose of calculating the recycled content contribution of concrete, the constituent materials in concrete (e.g., the cementitious materials, aggregates, and water) are allowed to be treated as separate components and calculated separately.

Recommendation: Adopt after considering individual or collective (IgCC) accounting

Justification: Generally good practice to encourage the use of such materials.

IgCC Comparison: 55% or more required for categories 9.4.1.1, 2 and 3 totaled.

Notes, References, Citations:

9.4.1.2 Regional Materials. A minimum of 15% of building materials or products used, based on cost, shall be regionally extracted/harvested/recovered or manufactured within a radius of 500 mi (800 km) of the project site. If only a fraction of a product or material is extracted/harvested/recovered or manufactured locally, then only that percentage (by weight) shall contribute to the regional value. **Exception:** For building materials or products shipped in part by rail or water, the total distance to the project shall be determined by weighted average, whereby that portion of the distance shipped by rail or water shall be multiplied by 0.25 and added to that portion not shipped by rail or water, provided that the total does not exceed 500 mi (800 km).

Recommendation: Adopt after considering individual or collective (IgCC) accounting

Justification: Generally good practice to encourage the use of such materials.

IgCC Comparison: 55% or more required for categories 9.4.1.1, 2 and 3 totaled.

Notes, References, Citations:

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9.4.1.3 Biobased Products. A minimum of 5% of building materials used, based on cost, shall be biobased products. Biobased products shall comply with the minimum biobased contents of the USDA's Designation of Biobased Items for Federal Procurement, contain the "USDA Certified Biobased Product" label, or be composed of solid wood, engineered wood, bamboo, wool, cotton, cork, agricultural fibers, or other biobased materials with at least 50% biobased content.

Recommendation: Adopt after considering individual or collective (IgCC) accounting

Justification: Generally good practice to encourage the use of such materials.

IgCC Comparison: 55% or more required for categories 9.4.1.1, 2 and 3 totaled.

Notes, References, Citations:

9.4.1.3.1 Wood Building Components. Wood building components including, but not limited to, structural framing, sheathing, flooring, sub-flooring, wood window sash and frames, doors, and architectural millwork used to comply with this requirement shall contain not less than 60% certified wood content tracked through a chain of custody process either by physical separation or percentage-based approaches. Acceptable certified wood content documentation shall be provided by sources certified through a forest certification system with principles, criteria, and standards developed using ISO/IEC Guide 59, or the WTO Technical Barriers to Trade. Wood building components from a vendor are allowed to comply when the annual average amount of certified wood products purchased by the vendor, for which they have chain of custody verification not older than two years, is 60% or greater of their total annual wood products purchased.

Recommendation: Adopt

Justification: Wood certification is standard in LEED; this is less stringent as to sources

IgCC Comparison: IgCC is simpler – groups all categories of sustainable materials, requires 55%

Notes, References, Citations:

9.5.1 Life-Cycle Assessment. A LCA shall be performed in accordance with ISO Standard 14044 for a minimum of two building alternatives, considering at least those material components included for consideration in Section 9.4.1, both of which shall conform to the OPR. Each building alternative shall consist of a common design, construction, and materials for the locale, including building size and use, as commonly approved by the AHJ. Each building alternative shall comply with Sections 6, 7, and 8. The service life of the buildings shall be not less than that determined using Table 10.3.2.3, except that the design life of long-life buildings shall be no less than 75 years.

Recommendation: Defer: LCA is not ready for primary use

Justification:

IgCC Comparison:

Notes, References, Citations:

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9.5.1.1 LCA Performance Metric. The building alternative chosen for the project shall have a 5% improvement over the other building alternative assessed in the LCA in a minimum of two of the impact categories. The impact categories are: land use (or habitat alteration), resource use, climate change, ozone layer depletion, human health effects, ecotoxicity, smog, acidification, and eutrophication.

Recommendation: Defer: LCA is not ready for primary use

Justification:

IgCC Comparison:

Notes, References, Citations:

9.5.1.2 Procedure. The LCA shall include the following three steps: Step 1: Perform a life-cycle inventory (LCI). The LCI accounts for all the individual environmental flows to and from the material components in a building throughout its life cycle. 1. The LCI shall include the materials and energy consumed and the emissions to air, land, and water for each of the following stages: a. Extracting and harvesting materials and fuel sources from nature. b. Processing building materials and manufacturing building components. c. Transporting materials and components. d. Assembly and construction. e. Maintenance, repair, and replacement during the design life with or without operational energy consumption. f. Demolition, disposal, recycling, and reuse of the building at the end of its life cycle. 2. The LCI shall account for emissions to air for the following: a. The six principal pollutants for which the USEPA has set National Ambient Air Quality Standards as required by the Clean Air Act and its amendments: carbon monoxide, nitrogen dioxide, lead, sulfur oxides, particulate matter (PM 10 and PM 2.5 and ozone. b. Greenhouse gases (not including water vapor and ozone) as described in the Inventory of U.S. Green-house Gas Emissions and Sinks: carbon dioxide, methane, nitrous oxide, chlorofluorocarbons, hydrochlorofluorocarbons, bromofluorocarbons, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, sulfur dioxide, and VOCs. c. Hazardous air pollutants listed in the Clean Air Act and its amendments. Step 2: Compare the two building alternatives using a published third-party impact indicator method that includes, at a minimum the impact categories listed in Section 9.5.1.1. An LCA report shall be prepared that meets the requirements for third-party reporting in ISO Standard 14044 and also includes: 1. A description of the two building alternatives, including: a. a description of the system boundary used, b. the design life of each building, and c. the physical differences between buildings. 2. The impact indicator method and impact categories used. 3. The results of the LCA indicating a minimum of 5% improvement in the proposed building compared to the other building alternative for a minimum of two impact categories, including an explanation of the rationale for the weighting and averaging of the impacts. Step 3: Conduct a critical review by an external expert independent of those performing the LCA.

Recommendation: Defer: LCA is not ready for primary use

Justification:

IgCC Comparison: Not included

Notes, References, Citations:

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9.5.1.3 Reporting. The following shall be submitted to the AHJ: a. The LCA report. b. The documentation of critical peer review by a third party including the results from the review and the reviewer's name and contact information.

Recommendation: Defer: LCA is not ready for primary use

Justification:

IgCC Comparison: Not included

Notes, References, Citations:

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2011 – ASHRAE 189.1 Chapter 10 – Construction and Plans for Operation
Summary:
Analysis and Recommendations
<p>10.1 Scope. This section specifies requirements for construction and plans for operation, including the commissioning process, building acceptance testing, measurement and verification, energy use reporting, durability, transportation management, erosion and sediment control, construction, and indoor air quality during construction.</p> <p>Recommendation: Adopt as written</p> <p>Justification: No action required</p> <p>IgCC Comparison:</p> <p>Notes, References, Citations:</p>
<p>10.2 Compliance. All of the provisions of Section 10 are mandatory provisions.</p> <p>Recommendation: Add – except where local codes and ordinances take precedence.</p> <p>Justification: DPS to determine if local codes and ordinances take precedence.</p> <p>IgCC Comparison:</p> <p>Notes, References, Citations:</p>
<p>10.3.1.1 Building Acceptance Testing. Acceptance testing shall be performed on all buildings in accordance with this section using generally accepted engineering standards and handbooks acceptable to the AHJ. An acceptance testing process shall be incorporated into the design and construction of the building project that verifies systems specified in this section perform in accordance with construction documents.</p> <p>Recommendation: DPS shall determine what generally accepted engineering standards and handbooks are acceptable to the AHJ</p> <p>Justification: DPS shall provide direction</p> <p>IgCC Comparison:</p> <p>Notes, References, Citations:</p>
<p>10.3.1.1.1 Activities Prior to Building Permit. Complete the following: a. Designate a project Acceptance Representative to lead, review, and oversee completion of acceptance testing activities. b. Construction documents shall indicate who is to perform acceptance tests and the details of the tests to be performed. c. Acceptance representative shall review construction documents to verify relevant sensor locations, devices, and control sequences are properly documented.</p> <p>Recommendation: Adopt as written</p> <p>Justification: Good practice</p> <p>IgCC Comparison:</p> <p>Notes, References, Citations:</p>

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10.3.1.1.2 Activities Prior to Building Occupancy. Complete the following: a. Verify proper installation and start-up of the systems. b. Perform acceptance tests. For each acceptance test, complete test form and include a signature and license number, as appropriate, for the party who has performed the test. c. Verify a system manual has been prepared that includes O&M documentation and full warranty information, and provides operating staff the information needed to understand and optimally operate building systems.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.3.1.1.3 Systems. The following systems, if included in the building project, shall have acceptance testing: a. Mechanical systems: heating, ventilating, air conditioning, IAQ, and refrigeration systems (mechanical and/or passive) and associated controls. b. Lighting systems: automatic daylighting controls, manual daylighting controls, occupancy sensing devices, and automatic shut-off controls c. Fenestration Control Systems: Automatic controls for shading devices and dynamic glazing. d. Renewable energy systems. e. Water measurement devices, as required in Section 6.3.3. f. Energy measurement devices, as required in Section 7.3.3

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.3.1.1.4 Documentation. The owner shall retain completed acceptance test forms

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

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10.3.1.2 Building Project Commissioning. For buildings that exceed 5000 ft² (500 m² of gross floor area, commissioning shall be performed in accordance with this section using generally accepted engineering standards and handbooks acceptable to the AHJ. Buildings undergoing the commissioning process will be deemed to comply with the requirements of Section 10.3.1.1, "Building Acceptance Testing." A commissioning process shall be incorporated into the predesign, design, construction, and first year occupancy of the building project that verifies that the delivered building and its components, assemblies, and systems comply with the documented OPR. Procedures, documentation, tools, and training shall be provided to the building operating staff to sustain features of the building assemblies and systems for the service life of the building. This material shall be assembled and organized into a systems manual that provides necessary information to the building operating staff to operate and maintain all commissioned systems identified within the building project.

Recommendation: Adopt with the following modification: For buildings that exceed 5000 ft² (500 m² of gross floor area and an energy density of __ watts per sq ft [DPS to enter minimum watts per sq ft], commissioning shall be performed in accordance with this section using generally accepted engineering standards and handbooks acceptable to the AHJ.

Justification: This is a more realistic approach for the need to commission a smaller building.

IgCC Comparison:

Notes, References, Citations:

10.3.1.2.1 Activities Prior to Building Permit. The following activities shall be completed: a. Designate a project commissioning authority (CxA) to lead, review, and oversee completion of the commissioning process activities prior to completion of schematic design. b. The owner, in conjunction with the design team as necessary, shall develop the OPR during predesign and updated during the design phase by the design team as necessary, in conjunction with the owner and the commissioning team. The OPR will be distributed to all parties participating in project programming, design, construction, and operations, and the commissioning team members. c. The design team shall develop the BOD. The BOD document shall include all the information required in Section 6.2, "Documentation," of ANSI/ASHRAE Standard 55. d. The CxA shall review both the OPR and BOD to ensure that no conflicting requirements or goals exist and that the OPR and BOD, based on the professional judgment and experience of the CxA, are sufficiently detailed for the project being undertaken. e. Construction phase commissioning requirements shall be incorporated into project specifications and other construction documents developed by the design team. f. The CxA shall conduct two focused OPR reviews of the construction documents: the first at near 50% design completion and the second of the final construction documents prior to delivery to the contractor. The purpose of these reviews is to verify that the documents achieve the construction phase OPR and the BOD document fully supports the OPR, with sufficient details. g. Develop and implement a commissioning plan containing all required forms and procedures for the complete testing of all equipment, systems, and controls included in Section 10.3.1.2.4.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

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10.3.1.2.2 Activities Prior to Building Occupancy. The following activities shall be completed: a. Verify the installation and performance of the systems to be commissioned, including completion of the construction checklist and verification.

Exception to 10.3.1.2.2(a): Systems that, because their operation is seasonally dependent, cannot be fully commissioned in accordance with the commissioning plan at time of occupancy. These systems shall be commissioned at the earliest time after occupancy when operation of systems is allowed to be fully demonstrated as determined by CxA. b. It shall be verified that the owner requirements for the training of operating personnel and building occupants is completed. Where systems cannot be fully commissioned at the time of occupancy because of seasonal dependence, the training of personnel and building occupants shall be completed when the systems' operation can be fully demonstrated by the CxA. c. Complete preliminary commissioning report. d. Verify a system manual has been prepared that includes O&M documentation, full warranty information, and provides operating staff the information needed to understand and operate the commissioned systems as designed.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.3.1.2.3 Post-Occupancy Activities. Complete the following: a. Complete any commissioning activities called out in the commissioning plan for systems whose commissioning can only be completed subsequent to building occupancy, including trend logging and off-season testing. b. Verify the owner requirements for training operating personnel and building occupants are completed for those systems whose seasonal operational dependence mean they were unable to be fully commissioned prior to building occupancy. c. Complete a final commissioning report.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

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10.3.1.2.4 Systems. The following systems, if included in the building project, shall be commissioned: a. Heating, ventilating, air-conditioning, IAQ, and refrigeration systems (mechanical and/or passive) and associated controls. Control sequences to be verified for compliance with construction documentation as part of verification. b. Building envelope systems, components, and assemblies to verify the thermal and moisture integrity. c. Building envelope pressurization to confirm air-tightness if included in BOD requirements. d. Lighting systems. e. Fenestration control systems: Automatic controls for shading devices and dynamic glazing. f. Irrigation. g. Plumbing. h. Domestic and process water pumping and mixing systems. i. Service water heating systems. j. Renewable energy systems. k. Water measurement devices, as required in Section 6.3.3. l. Energy measurement devices, as required in Section 7.3.3.

Recommendation: Adopt with modifications to revise language that requires full commissioning for disciplines with full industry support, and require partial commissioning for disciplines with emerging technology.

Justification: Good practice but more time is required for full implementation: readily achievable for several disciplines listed however there are many disciplines listed which are not supported by their respective industries in terms of product development, procedures, and trained/licensed professionals to comply with all requirements. Will have significant cost impact.

IgCC Comparison:

Notes, References, Citations:

10.3.1.2.5 Documentation. Owner shall retain the System Manual and Final Commissioning Report.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.3.1.3 Erosion and Sediment Control (ESC). Develop and implement an erosion and sediment control (ESC) plan for all construction activities. The ESC plan shall conform to the erosion and sedimentation control requirements of the most current version of the USEPA NPDES General Permit for Stormwater Discharges From Construction Activities or local erosion and sedimentation control standards and codes, whichever is more stringent and regardless of size of project.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

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10.3.1.4 Indoor Air Quality (IAQ) Construction Management. Develop and implement an indoor air quality (IAQ) construction management plan to include the following:

a. Air conveyance materials shall be stored and covered so that they remain clean. All filters and controls shall be in place and operational when HVAC systems are operated during building “flush-out” or baseline IAQ monitoring. Except for system startup, testing, balancing, and commissioning, permanent HVAC systems shall not be used during construction.

b. After construction ends, prior to occupancy and with all interior finishes installed, a post-construction, pre-occupancy building flush-out as described under Section 10.3.1.4 (b) 1, or post-construction, pre-occupancy baseline IAQ monitoring as described under Section 10.3.1.4 (b) 2 shall be performed:

1. Post-Construction, Pre-Occupancy Flush-Out: A total air volume of outdoor air in total air changes as defined by Equation 10.3.1.4 shall be supplied while maintaining an internal temperature of a minimum of 60°F (15°C) and relative humidity no higher than 60%. For buildings located in non-attainment areas, filtration and/or air cleaning as described in Section 8.3.1.3 shall be supplied when the Air Quality Index forecast exceeds 100 (category orange, red, purple, or maroon). One of the following options shall be followed:

(a) Continuous Post-Construction, Pre-Occupancy Flush-Out: The flush-out shall be continuous and supplied at an outdoor airflow rate no less than that determined in Section 8.3.1.1.

(b) Continuous Post-Construction, Pre-Occupancy/ Post-Occupancy Flush-Out: If occupancy is desired prior to completion of the flush-out, the space is allowed to be occupied following delivery of half of the total air changes calculated from Equation 10.3.1.4 to the space. The space shall be ventilated at a minimum rate of 0.30 cfm per ft² (1.5 L/s per m² of outdoor air or the outdoor airflow rate determined in Section 8.3.1.1, whichever is greater. These conditions shall be maintained until the total air changes calculated according to Equation 10.3.1.4 have been delivered to the space. The flush out shall be continuous. Equation 10.3.1.4: TAC V ot 1/A 1/H 60 min/h 24 h/day 14 days (I-P) TAC V ot 1 m 3 /1000 L 1/A 1/H 3600 s/h 24 h/day 14 days (SI) where TAC total air changes V ot system design outdoor air intake flow cfm (L/s) (according to Equation 6–8 of ANSI/ ASHRAE Standard 62.1) A floor area ft² (m² H ceiling height, ft (m)

2. Post-Construction, Pre-Occupancy Baseline IAQ Monitoring: Baseline IAQ testing shall be conducted after construction ends and prior to occupancy. The ventilation system shall be operated continuously within ±10% of the outdoor airflow rate provided by the ventilation system at design occupancy for a minimum of 24 hours prior to IAQ monitoring. Testing shall be done using protocols consistent with the USEPA Compendium of Methods for the Determination of Toxic Organic Pollutants in Ambient Air, TO-1, TO-11, TO-17 and ASTM Standard Method D 5197. The testing shall demonstrate that the contaminant maximum concentrations listed in Table 10.3.1.4 are not exceeded in the return airstreams of the HVAC systems that serve the space intended to be occupied. If the return airstream of the HVAC system serving the space intended to be occupied cannot be separated from other spaces either already occupied or not occupied at all, for each portion of the building served by a separate ventilation system, the testing shall demonstrate that the contaminant maximum concentrations at breathing zone listed in Table 10.3.1.4 are not exceeded in the larger of the following number of locations: (a) no less than one location per 25,000 ft² (2500 m² or (b) in each contiguous floor area. For each sampling point where the maximum concentration limits are exceeded conduct additional flush-out with outside air and retest the specific parameter(s) exceeded to demonstrate the requirements are achieved. Repeat procedure until all requirements have been met. When retesting non-complying building areas, take samples from the same locations as in the first test.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

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TABLE 10.3.1.4 Maximum Concentration of Air Pollutants Relevant to IAQ

Contaminant	Maximum Concentration, µg/m ³ (Unless Otherwise Noted)
Nonvolatile Organic Compounds	
Carbon monoxide (CO)	9 ppm and no greater than 2 ppm above outdoor levels
Ozone	0.075 ppm (8-hr)
Particulates (PM _{2.5})	35 (24-hr)
Particulates (PM ₁₀)	150 (24-hr)
Volatile Organic Compounds	
Acetaldehyde	140
Acrylonitrile	5
Benzene	60
1,3-Butadiene	20
t-Butyl methyl ether (Methyl-t-butyl ether)	8000
Carbon disulfide	800
Caprolactam*	100
Carbon tetrachloride	40
Chlorobenzene	1000
Chloroform	300
1,4-Dichlorobenzene	800
Dichloromethane (Methylene chloride)	400
1,1-Dioxane	3000
Ethylbenzene	2000
Ethylene glycol	400
Formaldehyde	33
2-Ethylhexanoic acid†	25
n-Hexane	7000
1-Methyl-2-pyrrolidinone*	160
Naphthalene	9
Nonanal†	13
Octanal†	7.2
Phenol	200
4-Phenylcyclohexene (4-PCHE)*	2.5
2-Propanol (Isopropanol)	7000
Styrene	900
Tetrachloroethene (Tetrachloroethylene, Perchloroethylene)	35
Toluene	300
1,1,1-Trichloroethane (Methyl chloroform)	1000
Trichloroethene (Trichloroethylene)	600
Nylene isomers	700
Total Volatile Organic Compounds (TVOC)	-

* This test is only required if carpets and fabrics with styrene-butadiene rubber (SBR) latex backing material are installed as part of the base building system.
† TVOC reporting shall be in accordance with CALIF. RULE 80174 and shall be in conjunction with the individual VOC's listed above.

Recommendation:

Justification:

IgCC Comparison:

Notes, References, Citations:

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10.3.1.5 Moisture Control. The following items to control moisture shall be implemented during construction: a. Materials stored onsite or materials installed that are absorptive shall be protected from moisture damage. b. Building construction materials that show visual evidence of biological growth due to the presence of moisture shall not be installed on the building project.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.3.1.6 Construction Activity Pollution Prevention: No-Idling of Construction Vehicles.

Vehicle staging areas shall be established for waiting to load or unload materials. These staging areas shall be located 100 ft (30 m) from any outdoor air intakes, operable openings, and hospitals, schools, residences, hotels, daycare facilities, elderly housing, and convalescent facilities.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.3.2 Plans for Operation. This section specifies the items to be included in plans for operation of a building project that falls under the requirements of this standard.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.3.2.1 High Performance Building Operation Plan. A Master Building Plan for Operation shall be developed that meets the requirements specified in Sections 10.3.2.1.1 through 10.3.2.1.4.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.3.2.1.1 Site Sustainability. A site sustainability portion of the Plan for Operation shall be developed and contain the following provisions. When trees and vegetation are used to comply with the shade requirements of Section 5.3.2.1, 5.4 or 5.5, the Plan for Operation shall include the maintenance procedures needed to maintain healthy vegetation growth. The Plan shall also outline the procedures for replacing any vegetation used to comply with the provisions in Section 5.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

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10.3.2.1.2 Water Use Efficiency. The Plan for Operation shall specify water use verification activities for building projects to track and assess building water consumption. The Plan shall describe the procedures needed to comply with the requirements outlined below.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.3.2.1.2.1 Initial Measurement and Verification. Use the water measurement devices and collection/storage infrastructure specified in Section 6.3.3 to collect and store water use data for each device, starting no later than after building acceptance testing has been completed and certificate of occupancy has been issued.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.3.2.1.2.2 Track and Assess Water Use. The Plan shall specify the procedures for tracking and assessing the building project water use, and the frequency for bench- mark comparisons. The initial assessment shall be completed after 12 months but no later than 18 months after a certificate of occupancy has been issued. Ongoing assessments shall be completed at least every three years. The Plan shall include the following: a. Usage Reports: Develop a Plan for collecting building project water use data for water sources and subsystems measured in Section 6.3.3. b. Benchmark Water Performance: Develop a Plan to enter building operating characteristics and water use data into the ENERGY STAR Portfolio Manager. For building parameter inputs into Portfolio Manager (e.g., number of occupants, hours of operation, etc.), use actual average values. c. Assess Water Use Performance: Develop a Plan to assess building project water use efficiency.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.3.2.1.2.3 Documentation of Water Use. All documents associated with the measurement and verification of the building's water use shall be retained by owner for a minimum of three years.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

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10.3.2.1.3 Energy Efficiency. The Plan for Operation shall specify energy performance verification activities for building projects to track and assess building energy performance. The Plan shall describe the procedures needed to comply with the requirements outlined below.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.3.2.1.3.1 Initial Measurement and Verification. Use the energy measurement devices and collection/ storage infrastructure specified in Section 7.3.3 to collect and store energy data for each device, starting no later than after acceptance testing has been completed and certificate of occupancy has been issued.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.3.2.1.3.2 Track and Assess Energy Consumption. The Plan for Operation shall specify the procedures for tracking and assessing the building project energy performance, and the frequency for benchmark comparisons. The initial assessment shall be completed after 12 months but no later than 18 months after a certificate of occupancy has been issued. Ongoing assessments shall be completed at least every three years. The Plan shall include the following: a. Energy Usage Reports: Develop a Plan for collecting building project energy data for energy sources and system energy loads measured in Section 7.3.3. The reports shall include the following, as minimum: 1. Hourly load profile for each day 2. Monthly average daily load profile 3. Monthly and annual energy use 4. Monthly and annual peak demand b. Track Energy Performance: Develop a Plan to enter building operating characteristics and energy consumption data into the ENERGY STAR Portfolio Manager for those building types addressed by this program to track building performance. For building parameter inputs into Portfolio Manager (e.g., number of occupants, hours of operation, number of PCs, etc.), use actual average values. c. Assess Energy Performance: Develop a Plan to assess building project energy performance.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.3.2.1.3.3 Documentation of Energy Efficiency. All documents associated with the measurement and verification of the building's energy efficiency shall be retained by owner.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

CHAPTER 10 – Construction and Plans for Operation
2011 ASHRAE 189.1
Analysis with Recommendations

10.3.2.1.4 Indoor Environmental Quality. The Plan for Operation shall include the requirements of Section 8 of ANSI/ASHRAE Standard 62.1 and shall describe the procedures for implementing a regular indoor environmental quality measurement and verification program after building occupancy, as outlined below.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.3.2.1.4.1 Outdoor Airflow Measurement. The Plan for Operation shall document procedures for implementing a regular outdoor airflow monitoring program after building occupancy. The Plan shall include minimum verification frequencies of airflows supplied by mechanical ventilation systems at the system level. Verification shall be performed using hand-held airflow measuring instruments appropriate for such measurements or permanently installed airflow measuring stations. Hand-held airflow measuring instruments or airflow measuring stations used for airflow verifications must be calibrated no more than 6 months prior to such verifications. Naturally ventilated systems shall be exempted from this requirement provided that the design parameters, including but not limited to permanent openings or window opening frequency are not modified.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.3.2.1.4.2 Outdoor Airflow Verification Procedures. The plan procedures shall contain the following requirements: a. For each mechanical ventilation system where direct outdoor airflow measurement is required according to Section 8.3.1.2, a procedure shall be in place to react when the outdoor airflow is 15% or more lower than minimum outdoor airflow rate. It shall be verified that the device that measures outdoor air flow rate is actually measuring the flow rate within $\pm 15\%$ of the sensor output reading at the minimum outdoor airflow rate. If the sensor is not within $\pm 15\%$, it shall be recalibrated. Verification of outdoor airflow shall be done on a quarterly basis and records maintained onsite. Direct outdoor airflow measurement devices shall be calibrated at the manufacturer's recommended interval or at least annually. b. For each mechanical ventilation system where direct outdoor airflow measurement is not required according to Section 8.3.1, a procedure shall be in place to verify outdoor airflow and records maintained onsite and shall be made available upon request.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

CHAPTER 10 - Construction and Plans for Operation
2011 ASHRAE 189.1
Analysis with Recommendations

10.3.2.1.4.3 Outdoor Airflow Scheduling. Ventilation systems shall be operated such that spaces are ventilated when these spaces are expected to be occupied.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.3.2.1.4.4 Outdoor Airflow Documentation. The following documentation shall be maintained concerning outdoor airflow measurement and verification. a. A list of each air system requiring direct outdoor air flow measurement. b. Monitoring procedures and monitoring frequencies for each monitored sensing device, including a description of the specific response measures to be taken if needed. c. Ventilation systems shall be operated such that spaces are ventilated when these spaces are expected to be occupied. d. Operation and calibration check procedures, and the records associated with operation checks and recalibration.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.3.2.1.4.5 Indoor Air Quality. The Plan for Operation shall document procedures for maintaining and monitoring indoor air quality after building occupancy, and shall contain the following: a. For buildings located in non-attainments areas for PM 2.5 as defined by the USEPA, air filtration and/or air cleaning equipment as defined in Section 8.3.1.3(a) shall be operated continuously during occupied hours or when the USEPA Air Quality Index exceeds 100 or equivalent designations by the local authorities for PM 2.5

Exception to 10.3.2.1.4.5(a): Spaces without mechanical ventilation. b. For buildings located in non-attainments areas for ozone as defined by the USEPA, air-cleaning equipment as defined in Section 8.3.1.3(b) shall be operated continuously during occupied hours during the local summer and fall seasons, or when the USEPA Air Quality Index exceeds 100 or equivalent designations by the local authorities for ozone.

Exception to 10.3.2.1.4.5(b): Spaces without mechanical ventilation. c. Biennial monitoring of Indoor Air Quality by one of the following methods: 1. Perform IAQ testing as described in Section 10.3.1.4. 2. Monitoring occupant perceptions of indoor air quality by any method, including but not limited to occupant questionnaires. 3. Each building shall have an occupant complaint/ response program for IEQ.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

CHAPTER 10 – Construction and Plans for Operation
2011 ASHRAE 189.1
Analysis with Recommendations

10.3.2.1.4.6 Building Green Cleaning Plan. A Green Cleaning Plan shall be developed for the building project in compliance with Green Seal Standard, GS-42. Exception: Dwelling units of a building project.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.3.2.1.4.7 Document all measurement and verification data.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.3.2.2 Maintenance Plan. A Maintenance Plan shall be developed for mechanical, electrical, plumbing, and fire protection systems, which includes the following: a. The Plan shall be in accordance with ANSI/ASHRAE/ ACCA Standard 180 for HVAC systems in buildings that meet the definition of commercial buildings in ANSI/ASHRAE/ACCA Standard 180. b. The Plan shall address all elements of Section 4 of ANSI/ASHRAE/ACCA Standard 180 and shall develop required inspection and maintenance tasks similar to Section 5 of ANSI/ASHRAE/ACCA Standard 180 for electrical and plumbing systems in buildings that meet the definition of commercial buildings in ANSI/ASHRAE/ACCA Standard 180. c. Documentation of the Plan and of completed maintenance procedures shall be maintained on the building site at all times in: 1. Electronic format for storage on the building Energy Management System (EMS), Building Management System (BMS), computerized maintenance management system (CMMS) or other computer storage means, or 2. Maintenance manuals specifically developed and maintained for documenting completed maintenance activities.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

CHAPTER 10 – Construction and Plans for Operation
2011 ASHRAE 189.1
Analysis with Recommendations

10.3.2.3 Service Life Plan. A Service Life Plan that is consistent with the OPR shall be developed to estimate to what extent structural, building envelope (not mechanical and electrical), and hardscape materials will need to be repaired or replaced during the service life of the building. The design service life of the building shall be no less than that determined using Table 10.3.2.3. The estimated service life shall be documented for building assemblies, products, and materials that will need to be inspected, repaired, and/or replaced during the service life of the building. Site improvements and hardscape shall also be included. Documentation in the Service Life Plan shall include the building project design service life and basis for determination, and the following for each assembly or component: a. Building assembly description b. Materials or products c. Design or estimated service life, years d. Maintenance frequency e. Maintenance access for components with an estimated service life less than the service life of the building Provide a Service Life Plan at the completion of design development. The owner shall retain a copy of the Service Life Plan for use during the life of building.

Recommendation: Adopt as written

Justification: Good practice

TABLE 10.3.2.3 Minimum Design Service Life for Buildings

Category	Minimum Service Life	Building Types
Temporary	Up to 10 years	Non-permanent construction buildings (sales offices, bankhouses) Temporary exhibition buildings
Medium life	25 years	Industrial buildings Stand-alone parking structures
Long life	50 years	All buildings not temporary or medium life, including the parking structures below buildings designed for long life category

10.3.2.4 Transportation Management Plan (TMP). A transportation management plan shall be developed compliant with the following requirements. Owner shall retain a copy of the transportation management plan.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.3.2.4.1 All Building Projects. The Plan shall include the following: a. Preferred parking for carpools and vanpools with parking facilities. b. A plan for bicycle transportation.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

CHAPTER 10 – Construction and Plans for Operation
2011 ASHRAE 189.1
Analysis with Recommendations

10.3.2.4.2 Owner–Occupied Building Projects or Portions of Building Projects. For owner–occupied buildings, or for the employees in the owner–occupied portions of a building, the building owner shall offer at least one of the following primary benefits to the owner’s employees: a. Incentivize employees to commute using mass transit, vanpool, carpool, or non–motorized forms of transportation. b. Initiate a telework or flexible work schedule program that reduces by at least 5% the number of commuting trips by the owner’s employees. c. Initiate a ridesharing or carpool matching program, either in–house or through an outside organization. **Exception:** Multifamily residential building project. In addition, the owner shall provide all of the following to the owner’s employees: a. Access to an emergency ride home for employees, either provided in–house or by an outside organization. b. A central point of contact in charge of commuter benefits. c. Maintenance of commuter benefits in a centralized location. d. Active promotion of commuter benefits to employees.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.3.2.4.3 Building Tenant. The building owner: a. shall provide a copy of the Plan to tenants within the building. b. shall not include parking fees in lease rates or shall identify the value of parking in the lease.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.4 Prescriptive Option. There are no prescriptive options.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

10.5 Performance Option. There are no performance options.

Recommendation: Adopt as written

Justification: Good practice

IgCC Comparison:

Notes, References, Citations:

EXECUTIVE SUMMARY

AIA-PV IgCC Task Force

July 30, 2013

Start Small:

There are many reasons to start small and expand with subsequent revision cycles. This allows time for the industry to come to grips with the new requirements of green codes. It also allows the opportunity to gather real data on the costs and benefits of its implementation.

Montgomery County has diverse building types in urban, suburban and rural settings therefore allowing alternative compliance paths is helpful and necessary to address these varying conditions.

One method for a phased approach is to make compliance optional and create incentives for complying with the code. Incentives can take the form of tax breaks, expedited permitting, or reduced permitting fees.

Another method is to make the most demanding requirements electives and specify a minimum number required. This also provides the opportunity to collect real world data. There is still skepticism about the business model for green building and energy efficient operational directives. Carefully crafted electives and pilot studies can help address that issue. This is the approach taken in the PV-Task Force's detailed recommendations in Attachment B.

Administrative Provisions:

The manner in which the DPS will manage review of projects under the green code is critical to its success. The PV-TF recommends that the DPS create standard forms, templates, and electronic submission protocols and have them in place on the date of adoption in order to administer the requirements in an efficient and effective manner. The requirements of the code also indicate a need for additional DPS review staff to avoid lengthening already long review times. DPS staff will need to be educated and fluent in the code criteria of several compliance paths because alternative compliance paths will have the best chance of a successful implementation process.

Jurisdictional Requirements:

Chapter 3 Jurisdictional Requirement 301.1.1, Scope Application: The task force recommends retaining the option of IgCC or ASHRAE 189.1 compliance paths, thus retaining maximum flexibility for the design team to choose the compliance path applicable to the building type and location. The task force further recommends that LEED Silver should be allowed as an alternative, non-mandatory, compliance path, because it has an established format, method of compliance, and documentation templates.

Electives:

Table 302.1, Requirements Determined by the Jurisdiction: The task force recommends striking the adoption of Table 302.1, the list of 22 additional requirements to be designated by the AHJ. The group feels that the overall number of electives required should apply to the entire code with some exceptions as noted in the Detailed Chapter Analysis and Recommendations.

Flexibility for the applicant is important. For new construction, 20% of electives are a reasonable number if the credits are spread among a minimum of four chapter categories. For existing buildings, 15% of electives are a reasonable number if the credits are spread among a minimum of two chapter categories.

Square Footage (SF) Size Thresholds:

Across-the-board square-footage size requirements will make adoption of the IgCC a hardship for many project types. The recommendation is to scale the SF thresholds based on the industry standards for type of use and energy use because the variables fall into three categories: a) applicability of the code, b) mechanical systems, and 3) envelope design. This will take more time to analyze and the PV-Task Force can assist the DPS to better define these thresholds.

Adoption in Other Jurisdictions:

While the scope of regional adoption of the IgCC was not a primary task for the PV-Task Force, the group notes the following observations in regard to green code adoption in the region:

Baltimore City Adoption

- In Baltimore City all newly constructed, extensively modified buildings that have or will have at least 10,000 square feet must be LEED-Silver certified or comply with the Baltimore City Green Building Standards (a LEED-like standard).
- Baltimore City is soon to introduce legislation expanding the options for building owners to select from a menu such that a project can be: LEED-Silver certified, or complies with the IgCC, or meets the ASHRAE 189.1 standard, or satisfies Enterprise Green Communities requirements, or complies with ICC 700. (This menu approach is similar to what DC is moving to.)
- The menu approach under legislative consideration will amend the existing Baltimore City Green Building Law whereby the listed options may be available in 4th quarter 2013 and the existing city-drafted regulatory alternative to LEED will remain available until June 1, 2015.
- The only real controversy in proposed legislation has been about the definitions for modified (i.e. the threshold for renovated buildings) structures and in the newly proposed code nearly all renovations will have to comply with the law.

Washington, D.C.

- Although typically slower than Maryland in adopting new code cycles, DC includes stakeholders in the process of code adoption. In the case of the IgCC, to date the input seems to be a great success.
- DC is considered a national green building leader. Green building standards there do not seem to be a deterrent to development.
- DC has adopted a modified approach to IgCC adoption. They moved many items to the Appendix section and recommended 15 credits be achieved, in any category, from 75 credit options.
- DC is more urban than Montgomery County, yet has several paths to compliance: IgCC, ASHRAE 189.1, LEED, and Enterprise Green Communities

Virginia Adoption

Adoption of the IgCC does not seem imminent. In conversations with VA officials, one of the main issues in adopting the IgCC is related to the land use, zoning, related impact the overlay code might have. Since the state of Virginia sets building codes, without local amendments, the IgCC might be considered too difficult to implement with such a diverse landscape, the officials stated that they do not plan to adopt at this time. If less restrictive to permit there, it could be perceived as an economic disadvantage to build or renovate in Montgomery County.

ATTACHMENT B

Detailed Chapter Analysis and Recommendations
AIA-PV IgCC Task Force
July 30, 2013

<u>IgCC Chapter</u>	<u>PDF Page No.</u>
Chapter 4 Site Development and Land Use (pg. 4-1:4-5)	2
Chapter 5 Material Resource Conservation and Efficiency (pg. 5-1:5-3)	7
Chapter 6 Energy Conservation, Efficiency and Co2e Emission Reduction (pg. 6-1:6-9)	10
Chapter 7 Water Resource Conservation, Quality and Efficiency (pg. 7-1:7-2)	19
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CHAPTER 4 – Site Development and Land Use
2012 IgCC/ 2011 ASHRAE 189.1
Analysis with Recommendations

2012 IgCC Chapter 04 – Site Development and Land Use

Summary:

Chapter 04 addresses many issues that historically have been regulated outside the Building Code. These include land use, natural resources, erosion and sediment control, stormwater, transportation and lighting. Given the strong regulatory track record of both Maryland and Montgomery County, we recommend that many of these provisions be struck from chapter 04 prior to adoption by the County. This is particularly true give the recent re-write of the Zoning Ordinance, which overlaps with a number of sections within chapter 04.

401.2 Predesign Site Inventory and Assessment: Requires the applicant to create inventory and assessment of natural resources on site, which must be submitted to AHJ with construction documents. Inventory should include all elements of sections 402 and 405.

Recommendation: Strike section in its entirety.

Justification: Conflicts and overlaps with existing regulations.

Ashrae 189.1 Comparison: The ASHRAE standard does not require an inventory.

Notes, References, Citations: MNCPPC already requires a Natural Resource Inventory / Forest Stand Delineation per County Code §22A.

402 Preservation of Natural Resources: Precludes buildings, site improvements and land disturbance in certain natural resource areas, including flood zones, surface water buffers, wetlands, conservation areas, parklands, agricultural lands and greenfield sites.

Recommendation: Strike section in its entirety.

Justification: Conflicts and overlaps with existing regulations.

Ashrae 189.1 Comparison: Section 5.3.1. has a similar prohibition, and should likewise be struck.

Notes, References, Citations: Land Use has historically been regulated through the Zoning Ordinance. In addition, County Code §19 already had strict standards for development in flood hazard areas. The Army Corps of Engineers likewise has well developed standards for wetland protection. MDE, MNCPPC and DPS all have existing regulations regarding development in these areas.

CHAPTER 4 – Site Development and Land Use
2012 IgCC/ 2011 ASHRAE 189.1
Analysis with Recommendations

403 Stormwater Management: Design and develop sites to minimize stormwater discharge.

Recommendation: Strike section in its entirety.

Justification: New stormwater regulations issued by MDE exceed IGCC standards.

Ashrae 189.1 Comparison: The ASHRAE standard does not address SWM.

Notes, References, Citations: The MDE regulations related to the predevelopment natural runoff are more stringent than this requirement. While the 95th percentile storm event isn't specifically required by the MDE regulations, if you provide environmental site design per the MDE regulations, you inherently achieve this 95th percentile requirement.

404.1.2.6.2 Irrigation System Design and Installation: Prohibits sprinklers in landscaped areas less than 4' in width.

Recommendation: Add "except where supplied by a drip irrigation system".

Justification: Urban development often includes narrower planting areas. This provision conflicts with the spirit of section 408 (heat island mitigation), since plant viability is significantly improved by irrigation.

Ashrae 189.1 Comparison: The ASHRAE standard does not address irrigation.

Notes, References, Citations:

404.1.2.6.3 Irrigation System Design and Installation: Prohibits sprinklers in landscaped areas less than 4' in width.

Recommendation: Revise text to read, "Be prohibited on slopes greater than 1 unit vertical to 3 units horizontal (33-percent slope). Where slopes are between 1 unit vertical to 4 units horizontal (25-percent slope) and 1 unit vertical to 3 units horizontal (33-percent slope), an erosion control fabric shall be applied to the irrigated area."

Justification: Slopes in excess of 25% are often seen in parks, golf courses and other recreational areas that require irrigation.

Ashrae 189.1 Comparison: The ASHRAE standard does not address irrigation.

Notes, References, Citations:

CHAPTER 4 – Site Development and Land Use
2012 IgCC/ 2011 ASHRAE 189.1
Analysis with Recommendations

405.1 Soil and Water Quality Protection: Requires protection and management of in-situ and imported soils. Includes standards for topsoil, soil reuse and soil restoration. AHJ must approve soil and water quality protection plan prior to construction start. Submission must include management plan for soils, E&S measures during construction, and maintenance protocols for landscaping and SWM.

Recommendation: Strike section in its entirety.

Justification: Conflicts and overlaps with existing regulations.

Ashrae 189.1 Comparison: The ASHRAE standard does not address soil and water quality protection.

Notes, References, Citations: County Code §19 already has standards for soil conservation and water quality protection. Site development is already extensively regulated by MCDPS and MDE.

405.2 Vegetation and Soil Protection: Requires protection and management of on-site soil and vegetation AHJ must approve plan prior to construction start. Submission must include management plan for ex. vegetation and invasive plants.

Recommendation: Strike section in its entirety.

Justification: Conflicts and overlaps with existing regulations.

Ashrae 189.1 Comparison: The ASHRAE standard does not address vegetation and soil protection.

Notes, References, Citations: County Code chapters §19 and 22 already include standards for soil protection and vegetation management. Site development is already extensively regulated by MNCPPC.

405.3 Native Plant Landscaping: Requires that 75% of newly landscaped areas be planted with native plants.

Recommendation: Change "75%" to "20%". Add additional sentence: "Areas that are planted in lawn or turf need not be considered in area calculated for native species."

Justification: Lawn is not native to Maryland, and if parks, golf courses and other areas are to be developed in the future, lawn must be excluded from the native plant calculation. Furthermore, certain urban microclimates vary so widely from "native" conditions that native plantings would be unviable, and must be considered inappropriate.

Ashrae 189.1 Comparison: ASHRAE section 5.3.4 addresses plants, and requires only that invasive plants be removed and destroyed.

Notes, References, Citations: None

CHAPTER 4 – Site Development and Land Use
2012 IgCC/ 2011 ASHRAE 189.1
Analysis with Recommendations

407.2 Changing and Shower Facilities: Requires that buildings >10,000 SF include changing rooms and shower facilities for bicycle users.

Recommendation: Strike section in its entirety.

Justification: Conflicts and overlaps with proposed regulation.

Ashrae 189.1 Comparison: The ASHRAE standard does not address bicycle usage.

Notes, References, Citations: The proposed revisions to the zoning ordinance address this. See §59-7.2.6.A.

407.3 Bicycle Parking and Storage: Requires long- and short-term bicycle parking at ratios shown in table 407.3.

Recommendation: Strike section in its entirety.

Justification: Conflicts and overlaps with proposed regulation.

Ashrae 189.1 Comparison: The ASHRAE standard does not address bicycle usage.

Notes, References, Citations: The proposed revisions to the zoning ordinance address this. See §59-7.2.

407.4 Preferred Vehicle Parking: Requires 5% dedicated parking spaces for HOVs for employees, as well as 5% dedicated parking spaces for LEVs, hybrids and electric vehicles for everyone.

Recommendation: Move section to Appendix A.

Justification: Conflicts and overlaps with proposed regulation.

Ashrae 189.1 Comparison: The ASHRAE standard does not address HOV and LEV usage.

Notes, References, Citations: The proposed revisions to the zoning ordinance address car share and van pool parking - see §59-7.2.3.H.b. NCPPC dropped proposed regulations regarding HOV, LEV, hybrid and EV parking after extensive public comment.

CHAPTER 4 – Site Development and Land Use
2012 IgCC/ 2011 ASHRAE 189.1
Analysis with Recommendations

409 Site Lighting: Restricts exterior lighting to address backlight, uplight and glare issues.

Recommendation: Strike section in its entirety.

Justification: Conflicts and overlaps with proposed regulation.

Ashrae 189.1 Comparison: ASHRAE section 5.3.3 address site lighting as well. It should be struck for the same reasons.

Notes, References, Citations: The proposed revisions to the zoning ordinance address site lighting - see §59-7.5.4.

CHAPTER 5 – Material Resource Conservation and Efficiency
2012 IgCC / 2011 ASHRAE 189.1
Analysis with Recommendations

2012 IgCC Chapter 5 – Material Resource Conservation and Efficiency

Summary:

This chapter deals with waste diversion, recycling and the use of used, recycled, recyclable, bio-based and indigenous materials, as well as a few other issues. Waste diversion ranges from 50% as required to 85% for two (2) elective credits in Appendix A. It also covers post-completion recycling which is already required in Montgomery County and need not be covered here. The chapter's minor incentives for reusing existing and historic buildings are a serious concern.

Chapter Section Analysis with Recommendations

501 General: Covers "building material conservation, resource efficiency and environmental performance."

501.1 Scope and Intent: The Chapter covers construction phase operations with the exception of Section 504.

Recommendation: Most of the requirements are conventional now, and doable depending on elective levels.

Justification: LEED and ASHRAE 189.1 requirements similar

ASHRAE 189.1 Comparison: Chapter 9: The statement of scope in Chapter 9 is much broader than IgCC Chapter 5 but the requirements in sum are not equally comprehensive. The requirements for waste diversion are comparable. The requirements for 'reduced impact materials': recycled content, regional materials, bio-based and wood are more specific under the Prescriptive Option.

Notes, References, Citations:

Appendix A: A105.1 - A105.4 covered below (503)

A105.5, A104.6 (Service Life and Deconstruction Plans) seem well-intentioned, but excessive, and need not be adopted.

A105.7, A105.8 (Existing and Historic Building Reuse) are insufficient incentives for the purpose and should be dealt with differently, or by a different code.

502: Construction Material Management

502.1 Scope and Intent: Management of materials

Recommendation: Omit. Should be covered by specifications requiring compliance with manufacturer's recommendations

Justification: Over-regulation

ASHRAE 189.1 Comparison: No such requirement in ASHRAE 189.1

Notes, References, Citations: None

CHAPTER 5 – Material Resource Conservation and Efficiency
2012 IgCC / 2011 ASHRAE 189.1
Analysis with Recommendations

503: Construction Waste Management

503.1 Scope and Intent: Requires minimum 50% diversion; defines waste to exclude 'land-clearing debris'

Recommendation: Adopt

Justification: LEED and ASHRAE 189.1 requirements similar

ASHRAE 189.1 Comparison: 50% Mandatory under 9.3.1.1

Notes, References, Citations: Appendix A: A105.1-4 give extra credits for increased diversion - Reasonable

504: Waste Management and Recycling

501.1 Scope and Intent: This applies to 'post certificate of occupancy' activity

Recommendation: Omit; covered to existing County Recycling Program and Requirements

Justification: LEED credits similar

ASHRAE 189.1 Comparison: No such requirement in ASHRAE

Notes, References, Citations: None

505: Material Selection

501.1 Scope and Intent: Requires 55% (mass, volume, cost) of project materials to be 'used, recycled, bio-based (wood), Indigenous' materials to be used

Recommendation: Adopt

Justification: LEED and ASHRAE 189.1 requirements similar

ASHRAE 189.1 Comparison: The Prescriptive option is more specific, but less demanding: 10% recycled, 5% bio-based, 15% sourced within 500 miles. Under the Performance option Life Cycle Assessment is required for compliance. This technique is too novel and untested to include in a County Code.

Notes, References, Citations: None

CHAPTER 5 – Material Resource Conservation and Efficiency
2012 IgCC / 2011 ASHRAE 189.1
Analysis with Recommendations

506: Lamps

501.1 Scope and Intent: To regulate mercury in lamps

Recommendation: Omit: covered by existing Federal and industry standards

Justification: Already regulated elsewhere

ASHRAE 189.1 Comparison: No such requirement in ASHRAE 189.1

Notes, References, Citations: None

507: Building Envelope Moisture Control

501.1 Scope and Intent: To keep building envelope dry. Requirements cover sub-soil drainage, waterproofing, damp proofing, vapor barriers, windows, wall coverings, roofs

Recommendation: Omit: covered by commissioning requirements

Justification: Already regulated elsewhere

ASHRAE 189.1 Comparison: No such requirement in ASHRAE 189.1

Notes, References, Citations: None

CHAPTER 6 – Energy Conservation, Efficiency and CO₂e Emission Reduction
2012 IgCC/ 2011 ASHRAE 189.1
Analysis with Recommendations

2012 IgCC Chapter 6 – Energy Conservation, Efficiency and CO₂e Emission Reduction

Summary:

This chapter contains the following requirements for renewable energy, metering and energy conservation which will substantially raise construction costs if adopted:

- The proposed prescriptive compliance path relies on an energy metric that has not been tested in practice.
- The requirements for renewable energy will not have their desired effects if their adoption encourages developers to build in other jurisdictions that do not enforce this code.
- The metering requirement disproportionately increases the construction costs of small projects.
- It is not clear if the current market is capable of supporting the additional amount of renewable energy required by this code.
- Although there is a clear need to create a market for renewable energy, it cannot be achieved at the expense of economic growth in the county.
- There are also numerous energy conservation requirements that are essentially identical to the 2012 IECC. Adopting these sections will unnecessarily complicate the permitting process, making development in the county even less attractive.

Chapter Analysis and Recommendations

602.1 Modeled performance pathway requirements: Presents the requirements for performance-based compliance that are based upon a predictive energy model: the zero energy performance index (zEPI).

Recommendation: Revise this section to utilize a comparative energy model similar to the IECC, 189.1 or ASHRAE 90.1.

Justification: The zEPI compares the proposed building to a building constructed in the base year of 2000. Adequate data does not exist to support this comparison for all building types. The zEPI also requires a predictive energy model, which requires additional effort and expertise. Predictive models frequently require tuning with real world energy data before becoming capable of accurately predicting energy use.

Ashrae 189.1 Comparison: The proposed change will bring the IgCC into alignment with 189.1 standard.

Notes, References, Citations: Most existing energy codes, including the IECC, 189.1 and ASHRAE 90.1, all utilized comparative energy models. For additional information please reference: "Rethinking Percent Savings— The Problem with Percent Savings and zEPI: The New Scale for a Net Zero Energy Future" by Charles Eley, FAIA, PE Kimberly Goodrich, John Arent, PE; Randall Higa, P and Devin Rauss, PE; 2011 ASHRAE Transactions Vol. 117, Part 2 pages 787 – 800.

602.1 MODELED PERFORMANCE PATHWAY REQUIREMENTS: Proposes an energy metric (zEPI < 51) requires buildings to use approximately 10% less energy than the 2012 IECC.

Recommendation: Create an optional requirement in the Appendix A for a 10% reduction in energy use compared the minimum requirements of the 2012 IECC.

Justification: Requiring a 10% reduction in energy use across the board will increase construction costs and may stifle economic growth in the county.

Ashrae 189.1 Comparison: Although a direct comparison of energy consumption is only meaningful on a case-by-case basis, this requirement is on par with the 189.1 standard.

Notes, References, Citations: Section 7.5, ANSI/ASHRAE/USGBC/IES Standard 189.1-20011.

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302.1 ADDITIONAL JURISDICTIONAL REQUIREMENTS: This optional requirement reduces the zEPI below 46, which requires the performance based compliance path.

Recommendation: Do not exercise this option.

Justification: Requiring substantial reductions in energy use will increase construction costs and stifle economic growth in the county. Requiring the performance based compliance path for all buildings will greatly complicate the permitting process.

Ashrae 189.1 Comparison: Although a direct comparison of energy consumption is only meaningful on a case-by-case basis, this requirement exceeds the 189.1 standard.

Notes, References, Citations: Section 7.5, ANSI/ASHRAE/USGBC/IES Standard 189.1-20011.

602.2 ANNUAL DIRECT AND INDIRECT CO₂ EMISSIONS: This option requires a 10% reduction in carbon dioxide emissions.

Recommendation: Remove the requirement for calculating equivalent carbon dioxide emissions.

Justification: This requirement unnecessarily complicates the permitting process. Simply requiring reductions in energy use will proportionally reduce the amount of carbon dioxide produced.

Ashrae 189.1 Comparison: Although direct comparisons of energy consumption are only meaningful on a case-by-case basis, this requirement exceeds the 189.1 standard.

Notes, References, Citations: Section 7.5.3, ANSI/ASHRAE/USGBC/IES Standard 189.1-20011.

603.2 ENERGY DISTRIBUTION DESIGN REQUIREMENTS AND LOAD TYPE ISOLATION IN BUILDINGS: All buildings over 25,000 square feet must separately meter HVAC, lighting, plug, process, building operations and miscellaneous loads.

Recommendation: Require only buildings that are both larger than 25,000 square feet and have building automation systems installed to comply with this section.

Justification: This requirement disproportionately increases the costs of smaller buildings that would not normally have building automation systems.

Ashrae 189.1 Comparison: The 189.1 standard does not require different load types to be metered.

Notes, References, Citations: Section 7.3.3, ANSI/ASHRAE/USGBC/IES Standard 189.1-20011.

603.3 ENERGY TYPE METERING: All buildings over 25,000 square feet must separately meter each type of energy entering the building.

Recommendation: Require only buildings that are larger than 25,000 square feet and that have building automation systems installed to comply with this section.

Justification: This requirement disproportionately increases the costs of smaller buildings that would not normally have building automation systems.

Ashrae 189.1 Comparison: The 189.1 standard requires different energy types to be metered only if the amount consumed exceeds a threshold.

Notes, References, Citations: Section 7.3.3, ANSI/ASHRAE/USGBC/IES Standard 189.1-20011.

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603.6 ENERGY DISPLAY: Requires an energy dashboard in the lobby of the building.

Recommendation: Remove the requirement for an energy dashboard.

Justification: Energy dashboards increase the costs of buildings and can be difficult to implement. They are based upon the Hawthorn effect which states that people change their habits once they realize they are being watched. Unfortunately, evidence shows that this effect only lasts a short time, after which people tend to revert to their previous habits.

Ashrae 189.1 Comparison: There is no corresponding requirement in the 189.1 standard.

Notes, References, Citations: 'The Hawthorne experiments: First statistical interpretation' by Franke, R. H. and Kaul, J. D., *American Sociological Review*, 1978, number 43, pages 623-643.

604.1 AUTOMATED DEMAND-RESPONSE (AUTO-DR) INFRASTRUCTURE: Peak load reduction must be automatically triggered as requested by the local utility.

Recommendation: Modify by making this requirement applicable only if the local utility implements automated demand control and make optional by moving it to Appendix A.

Justification: This requirement will disproportionately increase the costs of smaller buildings that do not typically have automated control systems.

Ashrae 189.1 Comparison: Requires a 10% reduction in peak energy, but does not require an automatic response.

Notes, References, Citations: Section 7.4.5.1, ANSI/ASHRAE/USGBC/IES Standard 189.1-20011.

604.3 HEATING VENTILATING AND AIR CONDITIONING SYSTEMS (HVAC): Requires a 10% reduction in the energy used by HVAC systems. Rebound avoidance is also specified.

Recommendation: Modify by making this requirement applicable only if the local utility implements automated demand control and make optional by moving it to Appendix A.

Justification: This requirement will disproportionately increase the costs of smaller buildings that do not typically have automated control systems.

Ashrae 189.1 Comparison: Requires a 10% reduction in peak energy, but does not require an automatic response.

Notes, References, Citations: Section 7.4.5.1, ANSI/ASHRAE/USGBC/IES Standard 189.1-20011.

604.4 LIGHTING: Requires a 15% reduction in the energy used by lighting systems. Rebound avoidance is also specified.

Recommendation: Modify by making this requirement applicable only if the local utility implements automated demand control and make optional by moving it to Appendix A.

Justification: This requirement will disproportionately increase the costs of smaller buildings that do not typically have automatic lighting control systems.

Ashrae 189.1 Comparison: Requires a 10% reduction in peak energy, but does not require an automatic response.

Notes, References, Citations: Section 7.4.5.1, ANSI/ASHRAE/USGBC/IES Standard 189.1-20011.

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605.1 ENVELOPE SYSTEMS: Requires a 10% improvement in insulation and fenestration over the IECC.

Recommendation: Modify by requiring only compliance with the 2012 IECC. Create an optional requirement in the Appendix A for a 10% improvement in insulation and fenestration compared to the minimum requirements of the 2012 IECC.

Justification: Replacing this section with an explicit reference to the IECC will simplify enforcement and make the code adherence easier. Requiring a 10% improvement across the board will increase construction costs and could reduce economic growth in the county.

Ashrae 189.1 Comparison: This requirement is comparable to the 189.1 standard.

Notes, References, Citations: Section 7.4.2, ANSI/ASHRAE/USGBC/IES Standard 189.1-20011 and Section C502.2, International Energy Conservation Code, 2012.

606.2 HVAC EQUIPMENT PERFORMANCE REQUIREMENTS: Requires minimum energy efficiencies that are more stringent than the IECC.

Recommendation: Modify by requiring only compliance with the 2012 IECC and create an optional requirement in the Appendix A for a 10% improvement in efficiency compared to the minimum requirements of the 2012 IECC.

Justification: Replacing this section with an explicit reference to the IECC will simplify enforcement and make the code much easier to comply with. Requiring a 10% improvement across the board will increase construction costs and stifle economic growth in the county.

Ashrae 189.1 Comparison: This requirement is comparable to the 189.1 standard.

Notes, References, Citations: Section 7.4.3, ANSI/ASHRAE/USGBC/IES Standard 189.1-20011 and Section C403, International Energy Conservation Code, 2012.

606.3 DUCT AND PLENUM INSULATION, SEALING AND TESTING: Duct insulation and leakage must comply with the IECC and medium pressure ducts must be leak tested.

Recommendation: Modify by requiring only compliance with the 2012 IECC.

Justification: This requirement is identical to the 2012 IECC. Replacing this section with an explicit reference to the IECC will simplify enforcement and make the code much easier to use.

Ashrae 189.1 Comparison: This requirement is comparable to the 189.1 standard.

Notes, References, Citations: Section 7.4.3.8, ANSI/ASHRAE/USGBC/IES Standard 189.1-20011 and Section C403.2.7, International Energy Conservation Code, 2012.

606.4 HEATING, VENTILATING AND AIR-CONDITIONING (HVAC) PIPING INSULATION: Pipe insulation requirements over and above the IECC.

Recommendation: Modify by requiring only compliance with the 2012 IECC.

Justification: Table 606.4 does not adequately address medium and high-pressure steam; pipe insulation is more adequately addressed by the 2012 IECC.

Ashrae 189.1 Comparison: This requirement is comparable to the 189.1 standard.

Notes, References, Citations: Section C403.2.8, International Energy Conservation Code, 2012.

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606.5 ECONOMIZERS: Economizers for systems three tons and larger explicitly required.

Recommendation: Modify by requiring only compliance with the 2012 IECC.

Justification: This requirement is identical to the 2012 IECC. Replacing this section with an explicit reference to the IECC will simplify enforcement and make the code much easier to use.

Ashrae 189.1 Comparison: This requirement is comparable to the 189.1 standard.

Notes, References, Citations: Section 7.4.3.3, ANSI/ASHRAE/USGBC/IES Standard 189.1-20011 and Section C403.3.1, International Energy Conservation Code, 2012.

607.2 Service Water Heating Systems: Minimum efficiency requirements for service hot water systems.

Recommendation: Modify by requiring only compliance with the 2012 IECC.

Justification: Minimum efficiency requirements are adequately covered in the federal regulations and the 2012 IECC.

Ashrae 189.1 Comparison: This requirement is comparable to the 189.1 standard.

Notes, References, Citations: Section 7.4.4, ANSI/ASHRAE/USGBC/IES Standard 189.1-20011 and Section C404.2, International Energy Conservation Code, 2012.

607.3 POOLS, HOT TUBS AND SPAS: Pools, hot tubs and spas must comply with the IECC. If located indoors they must receive 50% of their energy from renewable sources.

Recommendation: Remove this section.

Justification: Requiring additional on site renewable energy will create an economic hardship that could adversely affect the county's economy.

Ashrae 189.1 Comparison: There is no comparable requirement in the 189.1 standard.

Notes, References, Citations: None.

607.4 SNOWMELT SYSTEMS: Snowmelt systems must have 50% of their energy come from renewable sources.

Recommendation: Remove this section.

Justification: In climates having mild winters, this section conserves little energy. Enforcing this requirement will make public rail transportation projects that require switch or third rail heaters more expensive by requiring additional renewable energy.

Ashrae 189.1 Comparison: There is no comparable requirement in the 189.1 standard.

Notes, References, Citations: None.

607.5 WASTE WATER HEAT RECOVERY SYSTEM: Waste heat recovery is required for hot water required in A-2, F, R-1, R-2, A-3 and I-2 occupancies.

Recommendation: Remove this section.

Justification: The benefits of implementing heat recovery are best determined on a case-by-case basis by the registered design professional.

Ashrae 189.1 Comparison: There is no comparable requirement in the 189.1 standard.

Notes, References, Citations: None.

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607.6 SERVICE WATER HEATING PIPING INSULATION: Service water piping insulation requirements.

Recommendation: Modify by requiring only compliance with the 2012 IECC.

Justification: The 2012 IECC does an adequate job of defining the insulation requirements and replacing this section with an explicit reference to the IECC will simplify enforcement and compliance.

Ashrae 189.1 Comparison: This requirement is comparable to the 189.1 standard by implicit reference to the 90.1 standard.

Notes, References, Citations: Section 7.4.3, ANSI/ASHRAE/IESNA 90.1-2010 and Section C403.2.8, International Energy Conservation Code, 2012.

608.1.1 OCCUPANT SENSOR CONTROLS: Requires occupancy sensors.

Recommendation: Modify by requiring only compliance with the 2012 IECC.

Justification: The 2012 IECC does an adequate job requiring occupancy sensors and replacing this section with an explicit reference to the IECC simplifies enforcement and compliance.

Ashrae 189.1 Comparison: This requirement is comparable to the 189.1 standard.

Notes, References, Citations: Section 7.4.6, ANSI/ASHRAE/USGBC/IES Standard 189.1-20011 and Section C405.2.2, International Energy Conservation Code, 2012.

608.1.2 TIME SWITCH CONTROLS: Requires time switch and light reduction controls.

Recommendation: Modify by requiring only compliance with the 2012 IECC.

Justification: The 2012 IECC does an adequate job requiring occupancy sensors and replacing this section with an explicit reference to the IECC simplifies enforcement and compliance.

Ashrae 189.1 Comparison: This requirement is comparable to the 189.1 standard.

Notes, References, Citations: Section 7.4.6, ANSI/ASHRAE/USGBC/IES Standard 189.1-20011 and Section C405.2.2, International Energy Conservation Code, 2012.

608.3 INTERIOR LIGHT REDUCTION CONTROLS: Interior light reduction by 45% when areas are not occupied.

Recommendation: Replace this requirement with a power density factor of 0.95 and create an optional requirement in Appendix A to reduce interior lighting by 45% when areas are not occupied.

Justification: Requiring lighting controls will disproportionately increase the costs of buildings that normally would not have them.

Ashrae 189.1 Comparison: The proposed modification brings the IGCC in compliance with the 189.1 standard.

Notes, References, Citations: Section 7.4.6, ANSI/ASHRAE/USGBC/IES Standard 189.1-20011 and Section C405.2.2, International Energy Conservation Code, 2012.

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608.5 AUTOMATIC DAYLIGHT CONTROLS: Requirement for daylight harvesting.

Recommendation: Make this requirement optional by moving it to Appendix A.

Justification: Requiring lighting controls will disproportionately increase the costs of buildings that normally would not have them. Methods for reducing lighting power are best determined by the registered design professional.

Ashrae 189.1 Comparison: The proposed modification brings the IGCC in compliance with the 189.1 standard.

Notes, References, Citations: Section 7.4.6, ANSI/ASHRAE/USGBC/IES Standard 189.1-20011 and Section C405.2.2, International Energy Conservation Code, 2012.

608.8 ELECTRICAL SYSTEM EFFICIENCY: Minimum electrical system efficiency requirements for transformers and voltage drop in feeders.

Recommendation: Modify by requiring only compliance with the 2012 IECC.

Justification: The 2012 IECC does an adequate job defining efficiencies and replacing this section with an explicit reference to the IECC simplifies enforcement and compliance.

Ashrae 189.1 Comparison: This requirement is comparable to the 189.1 standard by implicit reference to the 90.1 standard.

Notes, References, Citations: Section 8.1, ANSI/ASHRAE/IESNA 90.1-2010.

608.10 VERIFICATION OF LAMPS AND BALLAST: Verification of lamps and ballasts required before issuance of certificate for occupancy.

Recommendation: Remove this section.

Justification: Requiring additional on-site inspections imposes an additional burden on the permitting authority.

Ashrae 189.1 Comparison: There is no comparable requirement in the 189.1 standard.

Notes, References, Citations: None.

608.11 VERIFICATION OF LIGHTING CONTROLS: Verification of lighting controls required before issuance of certificate for occupancy.

Recommendation: Remove this section.

Justification: Requiring additional on-site inspections imposes an additional burden on the permitting authority.

Ashrae 189.1 Comparison: There is no comparable requirement in the 189.1 standard.

Notes, References, Citations: None

609.2.1.3 VENTILATION: Requires minimum ventilation fan efficiency.

Recommendation: Clarify this requirement by explicitly stating that it does not apply to air conditioning systems.

Justification: This clarification simplifies enforcement and compliance.

Ashrae 189.1 Comparison: This requirement is comparable to the 189.1 standard by implicit reference to the 90.1 standard.

Notes, References, Citations: Section 10.4.3, ANSI/ASHRAE/IESNA Standard 90.1-2010.

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609.2.1.5 GUIDES: Prohibits the use of friction guides in elevators.

Recommendation: Remove the requirement for roller guides.

Justification: Large freight elevators typically do not have an option for roller guides.

Ashrae 189.1 Comparison: There is no comparable requirement in the 189.1 standard

Notes, References, Citations: None.

609.2.3 Appliances and Equipment: A minimum of 50% of commercial food service equipment shall be energy star rated.

Recommendation: Clarified that the 50% is based upon installed wattage and that equipment not covered by the energy star program are excluded.

Justification: Adding this reference will simplify enforcement and compliance.

Ashrae 189.1 Comparison: This requirement is comparable to the 189.1 standard.

Notes, References, Citations: Section 7.4.7.3, ANSI/ASHRAE/USGBC/IES Standard 189.1-20011.

609.2.2.5 STANDBY MODE: Escalators and moving walkways shall slow down when not in use.

Recommendation: Add an explicit reference to the ASME A17.1/CSA B44 standards.

Justification: Adding this reference will simplify enforcement and compliance.

Ashrae 189.1 Comparison: This requirement is comparable to the 189.1 standard.

Notes, References, Citations: Section 7.4.7.3, ANSI/ASHRAE/USGBC/IES Standard 189.1-20011.

610.1 RENEWABLE ENERGY SYSTEMS REQUIREMENTS: A minimum of 2% of buildings energy use must come from on-site solar electric, wind or solar hot water heating renewable sources.

Recommendation: Make this requirement optional by moving it to Appendix A.

Justification: Additional on site renewable energy requirements will create an economic hardship that could adversely affect the county's economic growth. Renewable energy is already adequately covered in the 2012 IECC, which are less demanding, and more closely match those found in the 189.1 standard.

Ashrae 189.1 Comparison: Standard 189.1 requires a minimum amount of renewable energy equal to 6.0 kBTUH/ft² times the roof area of single story buildings and 10.0 kBTUH/ft² times the roof area of multi-story buildings.

Notes, References, Citations: The 2012 IECC requires 0.5 Watts of renewable energy per square foot of conditioned space. Please reference section 7.3.2, ANSI/ASHRAE/USGBC/IES Standard 189.1-20011 and Section 406.4, International Energy Conservation Code, 2012. See also 'Comparison of ASHRAE Standard 90.1, 189.1 and IECC Codes for Large Office Buildings in TEXAS' by Jaya Mukhopadhyay, Juan-Carlos Baltazar, Ph.D., Hyojin Kim, Jeff S. Haberl, Ph.D., P.E., Cyndi Lewis and Bahman Yazdani, P.E, Energy Systems Laboratory, Texas A&M University ESL-IC-11-10-02.

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610.1 RENEWABLE ENERGY SYSTEMS REQUIREMENTS: A 10 year commitment to purchase 4% of the buildings energy use must come from off-site renewable sources in lieu of producing 2% on-site.

Recommendation: Make this requirement optional by moving it to Appendix A.

Justification: Requiring on site renewable energy will create an economic hardship that could adversely affect the county's economic growth.

Ashrae 189.1 Comparison: There is no comparable requirement in the 189.1 standard.

Notes, References, Citations: Section 7.3.2, ANSI/ASHRAE/USGBC/IES Standard 189.1-20011 and Section 406.4, International Energy Conservation Code, 2012.

CHAPTER 7 - Water Resource Conservation, Quality and Efficiency
2012 IgCC/ 2011 ASHRAE 189.1
Analysis with Recommendations

2012 IgCC Chapter 7 - Water Resource Conservation, Quality and Efficiency

Summary:

This Chapter covers water conservation, water quality and safe water consumption. Many aspects of this Chapter are covered by WSSC and its International Plumbing Code and need not be adopted in duplication. Critical issues are: 1) the hardship of required sub-metering, and 2) the absence of electives for non-gray water systems in Appendix A.

Chapter Section Analysis with Recommendations

701 General: Covers "water conservation, water quality and safe water consumption."

701.1 Scope and Intent: The chapter covers water use consumption limitations as well as safety necessitated by the gray water systems for which requirements are listed.

Recommendation: Adopt: Aside from the non-potable systems (706 - 710), the use limitations on potable systems are realistic and not now required by the County or WSSC. They are similar to LEED and ASHRAE 189.1. Sections 706 - 710 will be appropriate as graywater systems become more prevalent.

Justification: Potable water is an increasingly scarce commodity and must be used sparingly.

Ashrae 189.1 Comparison: Chapter 6: Fixture limitations are very similar; requires rainwater reuse for irrigation. Performance option requires graywater systems.

Notes, References, Citations:

Appendix A: All elective credits require gray, or rainwater re-use (rainwater for irrigation has no electives) - few County projects will qualify soon for any of these electives. All Electives are appropriate when graywater systems are available.

702: Fixtures, Fittings, Equipment and Appliances

Table 702.1 Scope and Intent: Maximum Flow Rates.

Recommendation: Adopt.

Justification: Significant priority; similar to LEED.

Ashrae 189.1 Comparison: Most Table 6.3.2.1 maxima identical to IgCC Table 702.1

Notes, References, Citations: None

CHAPTER 7 - Water Resource Conservation, Quality and Efficiency
2012 IgCC/ 2011 ASHRAE 189.1
Analysis with Recommendations

702: Fixtures, Fittings, Equipment and Appliances

702.7 - 702.20: These section provide requirements which duplicate the plumbing code

Recommendation: Omit

Justification: Redundant Regulation

ASHRAE 189.1 Comparison: No such requirements in ASHRAE 189.1

Notes, References, Citations: None

703 - 704, 706 - 710: These Sections provide requirements which duplicate the plumbing code with two exceptions noted below (703.2 and 705).

Recommendation: Omit

Justification: Redundant Regulation

ASHRAE 189.1 Comparison: No such requirements in ASHRAE 189.1; consumption limitations are more detailed

Notes, References, Citations:

703.2: Humidification Systems

703.2 Scope and Intent: Humidification to be locked out above 55%

Recommendation: Adopt

Justification: Especially appropriate in Montgomery County (climate); may be covered elsewhere

Ashrae 189.1 Comparison: No such requirement in ASHRAE 189.1

Notes, References, Citations: None

705: Metering

701.1 Scope and Intent: To separately meter each water source.

Recommendation: Adopt with thresholds: A burden on small users/uses

Justification: Codes should avoid unreasonable burdens on small businesses

Ashrae 189.1 Comparison: Metering required, thresholds (gal./day) set by Table 6.3.3A

Notes, References, Citations: None

CHAPTER 8 – Indoor Environmental Quality and Comfort
2012 IgCC / 2011 ASHRAE 189.1
Analysis with Recommendations

2012 – IgCC Chapter 8 – Indoor Environmental Quality and Comfort

Summary:

The recommendations in this section for IgCC Chapter 8 are made to better align the IgCC requirements with ASHRAE 189.1 Chapter 8. The lesser of the requirements are recommended to be maintained as written and some revisions are suggested. There were originally 6 Electives in Appendix A related to Chapter 8. This report reflects recommendations to move an additional 5 Sections (803.1, 803.4, 804.2, 807 in it's entirety, and 808 in it's entirety) to Appendix. A. Note that the recommendation to move entire Sections 807 Acoustics and 808 Daylighting to Appendix A for optional compliance (with some suggested modifications) represents a total of 27 additional sub-sections and paragraphs within 807 and 808. Both 807 and 808 address very important issues, but due to burdens required to AHJ via special inspections, complex or cumbersome calculations and diagrams, and the lack of a way for the AHJ to evaluate and rule on them contribute to the recommendation to make them optional.

Chapter Sections Analysis with Recommendations

801 General

801.1 Scope and Intent: The provisions of this chapter are intended to provide an interior environment that is conducive to the health of building occupants.

Recommendation: Maintain as written.

Justification: Good practice.

ASHRAE 189.1 Comparison: Chapter 8, 8.1 Scope is comparable, if not more cohesive.

Notes, References, Citations: None

801.2 General

Indoor Air quality management plan required. An indoor air quality management plan shall be developed. Such plan shall address the methods and procedures to be used during design and construction to obtain compliance with Sections 802 through 805.

Recommendation: Maintain as written

Justification: Good practice.

ASHRAE 189.1 Comparison: No direct reference to IAQ Management Plan; there is no conflict.

Notes, References, Citations: None

802 Building Construction Features, Operations and Maintenance Facilitation

802.1 Scope. To facilitate the operation and maintenance of the completed building, the building and its systems shall comply with the requirements of Section 802.2 and 802.3.

Recommendation: Maintain as written

Justification: Good practice

ASHRAE 189.1 Comparison: No direct reference; there is no conflict.

Notes, References, Citations: None

CHAPTER 8 – Indoor Environmental Quality and Comfort
2012 IgCC / 2011 ASHRAE 189.1
Analysis with Recommendations

802.2 Air Handling system access. The arrangement and location of air-handling system components including, but not limited to, ducts, air handler units, fans, coils and condensate pans, shall allow access for cleaning and repair of the air-handling surfaces of such components. Access ports shall be installed in the air-handling system to permit such cleaning and repairs. Piping, conduits, and other building components shall not be located so as to obstruct the required access ports.

Recommendation: Delete text and replace with reference to ASHRAE 62.1, Section 5.13.

Justification: Language is too broad and difficult to enforce on field. Generally access doors are not indicated on contract drawings. There is no difference in intent and general scope of requirements of Section 802.2 and ASHRAE 62.1-2010 Section 5.13 (Incorporated by ASHRAE 189.1 Section 8.3.1 by reference). However ASHRAE 62.1 requirements are more prescriptive and easy to enforce.

ASHRAE 189.1 Comparison: 8.3.1 Indoor Air Quality

Notes, References, Citations: ASHRAE 62.1, Section 5.13

802.3 Air Handling System Filters

Filter racks shall be designed to prevent airflow from bypassing filters. Access doors and panels provided for filter replacement shall be fitted with flexible seals to provide an effective seal between the doors and panels and the mating filter rack surfaces. Special tools shall not be required for opening access doors and panels. Filter access panels and doors shall not be obstructed.

Recommendation: Delete text and replace with reference to ASHRAE 62.1, Section 5.13.

Justification: Language is too broad and difficult to enforce on field. Generally access doors are not indicated on contract drawings. There is no difference in intent and general scope of requirements of Section 802.2 and ASHRAE 62.1-2010 Section 5.13 (Incorporated by ASHRAE 189.1 Section 8.3.1 by reference). However ASHRAE 62.1 requirements are more prescriptive and easy to enforce.

ASHRAE 189.1 Comparison: 8.3.1.3.c Indoor Air Quality

Notes, References, Citations: ASHRAE 62.1, Section 5.13

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Analysis with Recommendations

803 HVAC Systems

803.1 Construction phase requirements. The ventilation of buildings, during the construction phase shall be in accordance with Section 803.1.1. through 803.1.3.

803.1.1 Duct Openings: Duct and other related air distribution component openings shall be covered with tape, plastic, sheet metal or shall be closed by an approved method to reduce the amount of dust and debris that collects in the system from the time of rough-in installation and until startup of the heating and cooling equipment. Dust and debris shall be cleaned from duct openings prior to system flush out and building occupancy.

803.1.2 Indoor Air Quality during construction: Temporary ventilation during construction shall be provided in accordance with Sections 803.1.2.1 through 803.1.2.3.

803.1.2.1 Ventilation: Ventilation during construction shall be achieved through openings in the building envelope using one or more of the following methods: 1. Natural ventilation in accordance with the provisions of the IBC or the IMC. 2. Fans that produce a minimum of three air changes per hour. 3. Exhaust in the work area at a rate of no less than 0.05 cmf/ft² (0.24 L/s/in²) and not less than 10 percent greater than the supply air rate so as to maintain negative pressurization of the space.

803.1.2.2 Protection of HVAC system openings. HVAC supply and return duct and equipment openings shall be protected during dust-producing operations.

803.1.2.3 Return air filters. Where a forced air HVAC system is used during construction, new return air filters shall be installed prior to system flush out and building occupancy.

803.1.3 Construction phase ductless system or filter. Where spaces are conditioned during the construction phase, space conditioning systems shall be of the ductless variety, or filters for ducted systems shall be rated at MERV 8 or higher in accordance with ASHRAE 52.2 and system equipment shall be designed to be compatible: Duct system design shall account for pressure drop across the filter.

Recommendation: Adopt as written

Justification: Good practice

ASHRAE 189.1 Comparison: No reference in ASHRAE 189.1.

Notes, References, Citations: LEED-NC/S 2009 optional credit (IEQc3.1/3.2).

803.2 Thermal environmental conditions for human occupancy

Recommendation: Move to Appendix A.

Justification: Good practice but could be restrictive in HVAC design and budget if a/c and more stringent ventilation is required to meet compliance in this first issuance.

ASHRAE 189.1 Comparison: 8.3.2 "Thermal Environmental Conditions for Human Occupancy" requires compliance with ASHRAE 55, Sections 6.1 and 6.2.

Notes, References, Citations: ASHRAE 55 Section 6.1, 6.2, and LEED-NC/S 2009 Optional credit (IEQc7.1).

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803.3 Environmental tobacco smoke control

Smoking shall not be allowed inside of buildings. Any exterior designated smoking areas shall not be located less than 25 ft. away from building entrances, outdoor air intakes, and operable windows.

Recommendation: Maintain as written.

Justification: Good practice

ASHRAE 189.1 Comparison: 8.3.1.4 "Environmental Smoke Control" is comparable in scope

Notes, References, Citations: Some county requirements exist. LEED-NC/S 2009 prerequisite (IEQp2)

803.4 Isolation of pollutant sources.

The isolation of pollutant sources related to print, copy and janitorial rooms, garages and hangars shall be in accordance with Section 803.4.1.

803.4.1 Printer, copier and janitorial rooms. Enclosed rooms or spaces that are over 100 square feet (9.3 m²) in area and that are used primarily as a print or copy facility containing five or more printers, copy machines, scanners, facsimile machines or similar machines in any combination, and rooms used primarily as janitorial rooms or closets where the use or storage of chemicals occurs, shall comply with all of the following:

1. The enclosing walls shall extend from the floor surface to the underside of the floor, roof deck or solid ceiling above and shall be constructed to resist the passage of airborne chemical pollutants and shall be constructed and sealed as required for 1-hour fire-resistance-rated construction assemblies. Alternatively, for janitorial rooms and closets, all chemicals shall be stored in *approved* chemical safety storage cabinets.
2. Doors in the enclosing walls shall be automatic or self-closing.
3. An HVAC system shall be provided that: provides separate exhaust airflow to the outdoors at a rate of not less than 0.50 cfm per square foot (2.4 L/s/m²); that maintains a negative pressure of not less than 7 Pa within the room; and that prohibits the recirculation of air from the room to other portions of the building.

Recommendation: Strike 803.4 and sub section 803.4.1. Consider adding a building entry mat system as an Optional Requirement in Appendix A (refer to ASHRAE 189.1 for entry mat verbiage).

Justification: Recommendation for striking the section is based on the fact that it does not acknowledge advances in copy/print technologies, decreasing reliance on printed documents, room use changes over the life of the building, increase using of non-hazardous (green) cleaning products and requirements for fire rated enclosures at rooms where life safety is not a concern. Additionally, standards regarding office equipment emissions are dated and lack of standardization make studies difficult to interpret and current state of research is sparse.

This section does not address requirements for Entrance Mat systems to capture outdoor pollutants from entering into the building. Entrance Mat system, although desirable may not be practical for small projects and/or some building types – therefore, recommended for Appendix A.

ASHRAE 189.1 Comparison: 8.3.1 "Indoor Air Quality" and 8.3.1.5 "Building Entrances". ASHRAE 189.1 does not mandate Printer, Copier, and Janitorial Rooms to have deck to deck partitions or hard ceilings and self-closing doors, but instead depends on contaminant dilution, by increased ventilation rates. The exhaust airflow requirements are established by reference to ASHRAE 62.1-2010. Requirement for building entrance mat system is same as LEED 2009 NC IEQ Credit 5. Consider Building Entry mat system to be an optional requirement as it may not be practical for some small projects.

Notes, References, Citations: LEED-NC/S 2009 optional credit (IEQc5)

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803.5 Filters.

Filters for air-conditioning systems that serve occupied spaces shall be rated at MERV 11 or higher, in accordance with ASHRAE Standard 52.2, and system equipment shall be designed to be compatible. The air-handling system design shall account for pressure drop across the filter. The pressure drop across clean MERV 11 filters shall be not greater than 0.45 in. w.c. at 500 FPM (412 Pa at 2.54 m/s) filter face velocity. Filter performance shall be shown on the filter manufacturer's data sheet.

Recommendation: Maintain requirements as written.

Justification: Good practice. Maryland Ambient Air Quality Standard is PM_{2.5}. MERV 11 is the minimum filter efficiency required per Section 6.2.1.2 of ASHRAE 62.1. This is less stringent than MERV 13 required under Section 8.3.1.3, subparagraph 3 of ASHRAE 189.1. Also, specifying maximum allowable pressure drop assures an optimal selection of filter that balances the filter efficiency and energy efficiency.

ASHRAE 189.1 Comparison: 8.3.1.3 "Filtration and Air Cleaner Requirements". MERV rating of 13 is higher than what is required by ASHRAE 62.1-2010, or IgCC 2012. MERV 13 requirement should be optional. MERV 11 should be required.

Notes, References, Citations: LEED-NC/S 2009 optional credit (IEQc3) but doesn't include pressure drop.

804 Specific Indoor Air Quality and Pollutant Control Measures

804.1 Fireplaces and appliances: Where located within buildings, fireplaces, solid fuel-burning appliances, vented decorative gas appliances, vented gas fireplace heaters and decorative gas appliances for installation in fireplaces shall comply with Sections 804.1.1 through 804.1.3. Unvented room heaters and unvented decorative appliances, including alcohol burning, shall be prohibited.

804.1.1 Venting and combustion air.

Fireplaces and fuel-burning appliances shall be vented to the outdoors and shall be provided with combustion air provided from the outdoors in accordance with the *International Mechanical Code* and the *International Fuel Gas Code*. Solid-fuel-burning fireplaces shall be provided with a means to tightly close off the chimney flue and combustion air openings when the fireplace is not in use.

804.1.2 Wood-fired appliances.

Wood stoves and wood-burning fireplace inserts shall be listed and, additionally, shall be labeled in accordance with the requirements of the EPA Standards of Performance for New Residential Wood Heaters, 40 CFR Part 60, subpart AAA.

804.1.3 Biomass appliances.

Biomass fireplaces, stoves and inserts shall be listed and labeled in accordance with ASTM E 1509 or UL 1482. Biomass furnaces shall be listed and labeled in accordance with CSA B366.1 or UL 391. Biomass boilers shall be listed and labeled in accordance with CSA B366.1 or UL 2523.

Recommendation: Strike this section.

Justification: Should be covered under IMC or equivalent code already enforceable.

ASHRAE 189.1 Comparison: None

Notes, References, Citations: IMC or UL or equivalent.

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804.2 Post-construction, pre-occupancy baseline IAQ testing

Recommendation: Note that this is already an Optional Requirement in Table 302.1. Keep Optional and move to Appendix A.

Justification: Post occupancy testing is difficult to enforce – could be a hardship or restrictive for budget and construction schedule for small projects for this first code cycle.

ASHRAE 189.1 Comparison: None

Notes, References, Citations: LEED-NC/S 2009 Optional credit (IEQc3.2) gives option for testing or full/phased flushout.

805 Prohibited Materials

805.1 Scope. The use of the following materials shall be prohibited:

1. Asbestos-containing materials.
2. Urea-formaldehyde foam insulation

Recommendation: Maintain as written.

Justification: Good practice. Does not hurt even if restricted under different regulation. The use and manufacture of Asbestos was banned under EPA's Toxic Substance Control Act (TSCA) in 1989, however the Courts limited the ban to only those products that were not being manufactured in 1989.

ASHRAE 189.1 Comparison: None

Notes, References, Citations: LEED-NC/S 2009 optional credit (IEQc4) – only restricts urea-formaldehyde, not asbestos.

806 Material Emissions and Pollutant Control

806.1 Emissions from composite wood products.

Composite wood products used interior to the *approved* weather covering of the building shall comply with the emission limits or be manufactured in accordance with the standards cited in Table 806.1. Compliance with emission limits shall be demonstrated following the requirements of Section 93120 of Title 17, California Code of Regulations, *Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products*.

Exceptions:

1. Composite wood products that are made using adhesives that do not contain urea-formaldehyde (UF) resins.
2. Composite wood products that are sealed with an impermeable material on all sides and edges.
3. Composite wood products that are used to make elements considered to be furniture, fixtures and equipment (FF&E) that are not permanently installed.

Recommendation: Strike this section.

Justification: EPA may be regulating this in the near future and it could be cost prohibitive as all products are not readily available in the market

ASHRAE 189.1 Comparison: 8.4.2.4 In line with near future federal EPA standards so there is no conflict with 189.1 and IgCC. Recommend striking it.

Notes, References, Citations: LEED-NC/S 2009 optional credit (IEQc4.4 with modifications)

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806.2 Adhesives and sealants.

A minimum of 85 percent by weight or volume, of specific categories of site-applied adhesives and sealants used on the interior side of the building envelope shall comply with the VOC content limits in Table 806.2(1) or alternative VOC emission limits in Table 806.2(2). The VOC content shall be determined in accordance with the appropriate standard being either U.S. EPA Method 24 or SCAQMD Method 304, 316A or 316B. The exempt compound content shall be determined by either SCAQMD Methods 302 and 303 or ASTM D 3960. Table 806.2(1) adhesives and sealants regulatory category and VOC content compliance determination shall conform to the SCAQMD Rule 1168 Adhesive and Sealant Applications as amended on 1/7/05. The provisions of this section shall not apply to adhesives and sealants subject to state or federal consumer product VOC regulations. HVAC duct sealants shall be classified as "Other" category within the SCAQMD Rule 1168 sealants table.

Exception: HVAC air duct sealants are not required to meet the emissions or the VOC content requirements when the air temperature in which they are applied is less than 40°F (4.5°C).

Recommendation: Maintain as written.

Justification: Aligns with SCAQMD Rule 1168 and Green Seal GS-36.

ASHRAE 189.1 Comparison: 8.4.2.1 (references SCAQMD Rule 1168, Green Seal GS-36) Adopt as written: good practice. Requires that everything be compliant (not 85% like IgCC).

Notes, References, Citations: LEED-NC/S 2009 optional credit (IEQc4.2 with modifications)

806.3 Architectural paints and coatings.

A minimum of 85 percent by weight or volume, of site-applied interior architectural coatings shall comply with VOC content limits in Table 806.3(1) or the alternate emissions limits in Table 806.3(2). The exempt compound content shall be determined by ASTM D 3960.

Recommendation: Maintain as written.

Justification: Good practice. Several high-performance specialty and maintenance coatings have either higher VOC limits or are exempt per SCAQMD Rules.

ASHRAE 189.1 Comparison: 8.4.2.1 (references Green Seal GS-11, SCAQMD Rule 113). Adopt as written: good practice. Requires that everything be compliant (not 85% like IgCC).

Notes, References, Citations: LEED-NC/S 2009 optional credit (IEQc4.1 with modifications)

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806.4 Flooring.

A minimum of 85 percent of the total area of flooring installed within the interior of the building shall comply with the requirements of Table 806.4(2). Where flooring with more than one distinct product layer is installed, the emissions from each layer shall comply with these requirements. The test methodology used to determine compliance shall be from CDPH/EHLB/Standard Method V.1.1, *Standard Method for Testing VOC Emissions From Indoor Sources*, dated February 2010. The emissions testing shall be performed by a laboratory that has the CDPH/EHLB/Standard Method V.1.1 test methodology in the scope of its ISO 17025 Accreditation.

Where post-manufacture coatings or surface applications have not been applied, the flooring listed in Table 806.4(1) shall be deemed to comply with the requirements of Table 806.4(2).

Recommendation: Maintain as written.

Justification: Good practice.

ASHRAE 189.1 Comparison: 8.4.2.3 (references California Section 01350)

Notes, References, Citations: LEED-NC/S 2009 optional credit (IEQc4.3 with modifications)

806.5 Acoustical ceiling tiles and wall systems.

A minimum of 85 percent of acoustical ceiling tiles and wall systems, by square feet, shall comply with the requirements of Table 806.5(2). Where ceiling and wall systems with more than one distinct product layer are installed, the emissions from each layer shall comply with these requirements. The test methodology used to determine compliance shall be from CDPH/EHLB/Standard Method V.1.1, *Standard Method for Testing VOC Emissions From Indoor Sources*, dated February 2010. The emissions testing shall be performed by a laboratory that has the CDPH/EHLB/Standard Method V.1.1 test methodology in the scope of its ISO 17025 Accreditation.

Where post-manufacture coatings or surface applications have not been applied, the ceiling or wall systems listed in Table 806.5(1) shall be deemed to comply with the requirements of Table 806.5(2).

Recommendation: Maintain as written.

Justification: Good practice.

ASHRAE 189.1 Comparison: 8.4.2.6 (references CDPH/EHLB/Standard Method V.1.1 (commonly referred to as California Section 01350))

Notes, References, Citations: LEED-NC/S 2009 optional credit (IEQc4.6 with modifications)

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806.6 Insulation.

A minimum of 85 percent of insulation shall comply with the requirements of Table 806.6(1) or Table 808.6(2). The test methodology used to determine compliance shall be from CDPH/EHLB/Standard Method V.1.1, *Standard Method for Testing VOC Emissions From Indoor Sources*, dated February 2010. The emissions testing shall be performed by a laboratory that has the CDPH/EHLB/Standard Method V.1.1 test methodology in the scope of its ISO 17025 Accreditation.

TABLE 806.6(1) INSULATION VOC EMISSION LIMITS

VOC	LIMIT
Individual	≤ 1/2 CA chronic REL ^a
Formaldehyde	≤ 16.5 µg/m ³ or ≤ 13.5 ppb

TABLE 806.6(2) INSULATION MANUFACTURED WITHOUT FORMALDEHYDE VOC EMISSION LIMITS

VOC	LIMIT
Individual	≤ 1/2 CA chronic REL ^a

Recommendation: Maintain as written.

Justification: Good practice.

ASHRAE 189.1 Comparison: 8.4.2.6 (references CDPH/EHLB/Standard Method V1.1 (commonly referred to as California Section 01350))

Notes, References, Citations: None

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SECTION 807 ACOUSTICS

Moved to Appendix A in its entirety

807.1 Sound transmission and sound levels.

807.2 Sound transmission.

807.2.1 Interior sound transmission.

807.2.2 Mechanical and emergency generator equipment and systems.

807.3 Sound levels.

807.3.1 Sound of mechanical and electrical generator equipment outside of buildings.

807.3.2 Sound of HVAC and mechanical systems within buildings.

807.4 Structure-borne sounds.

807.5 Special Inspections for sound levels.

807.5.1 Testing for mechanical and electrical generator equipment outside of buildings.

807.5.2 Testing for building system background noise.

807.5.3 Separating assemblies.

807.5.4 HVAC background sound.

807.6 Special Inspections for sound transmission.

807.6.1 Testing for mechanical and emergency generator equipment outside of buildings.

807.6.2 Testing for building system background noise.

Recommendation: 807.1 through 807.5.2 already Optional per Table 302.1: move to Appendix A. 807.5.3 through 806.2 make optional and move to Appendix A.

Justification: Good practice: 807.1 through 807.4 are important and relevant. However, the potential impacts on design schedule, construction schedule, and budgets (esp. for small projects that may not have encountered this before) is restrictive. 807.5 and 807.6: Special Inspections is a hardship and difficult to enforce by AHJ (807.6). When comparing IgCC numbers against ASHRAE Chapter 48 Vibration and Noise Control, determined that comparisons were all over the scale, but generally the IgCC is more lenient. Perhaps in the next code cycle Acoustics can be added in and standardized as required.

ASHRAE 189.1 Comparison: 8.3.2 and 8.3.3

Notes, References, Citations: Nothing this in-depth. LEED for Schools 2009, which applies only to new school construction and not commercial, has prerequisite (reverberation time and background noise) and optional credits (higher STC and background noise levels).

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808 Daylighting

808.1 General.

808.1.1 Fenestration obstructions.

Recommendation: Make optional and move to Appendix A

Justification: Good practice. IgCC will move daylight design from academic research and specialty consulting out into the mainstream of standard architectural practice. But it will influence or make more critical various design and cost issues related to building form, floor plan geometries, orientation, amount of fenestration, shading and etc. It will require from architects more innovation and technical design skills to minimize cost implications.

The new Code will result in dramatic changes required for the new build environment and should be introduced gradually.

ASHRAE 189.1 Comparison: None

Notes, References, Citations: LEED-NC/S 2008 IEQc8.1 has some basic requirements that have been utilized for years, but since it's optional, not everyone can or will comply.

808.2 Applicability.

Recommendation: Make optional and move to Appendix A.

Justification: Good practice. If entire section of 808 is moved to Appendix A, then the applicability requirements are not necessary.

ASHRAE 189.1 Comparison: None

Notes, References, Citations: LEED-NC/S 2008 IEQc8.1 has some basic requirements that have been utilized for years, but since it's optional, not everyone can or will comply.

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808.3 Daylit area of building spaces.

Recommendation: Make optional and move to Appendix A

Strike "Exception" and replace with ASHRAE language 8.4.1.1 Exception 3 and 8.5.1.1 Exception

ASHRAE 8.4.1.1 Exception for Daylight areas where the height of existing adjacent structures above the window is at least twice the distance between the window and the adjacent structures, measured from the top of the glazing.

ASHRAE 8.5.1.1 Exception for where the simulation demonstrates that existing adjacent structures preclude meeting the illuminance requirements.

Justification: Good practice. Code will move daylight design from academic research and specialty consulting out into the mainstream of standard architectural practice. But it will affect building form, floor plan geometries, orientation, amount of fenestration and shading etc. It will require more innovation and technical design skills to minimize cost implications. Exception language is too complex as written. The Exception description is too complex and appears as academic rather than prescriptive Code language. ASHRAE is more simple language.

ASHRAE 189.1 Comparison: 8.4 and 8.5. Prescriptive Option with specific sidelighting, shading requirements. 8.5 Performance Option - Daylight Simulation; 30 fc for 75% of area of daylight area. Deals with Glare (which is often overlooked). Top lighting is in Mandatory provisions. ASHRAE prescriptive side lighting standard calls for minimum Effective Aperture Top lighting standard have electrical lighting power density thresholds. Includes requirements for exterior sun shading (IgCC calls for sun shading in different chapter). Exceptions defined by results of simulations or simple obstruction definitions.

Notes, References, Citations: LEED-NC/S 2008 IEQc8.1 has some basic requirements that have been utilized for years, but since it's optional, not everyone can or will comply.

808.3.1 Daylight prescriptive requirements.

Recommendation: Make optional and move to Appendix A

Justification: Good practice.

ASHRAE 189.1 Comparison:

Notes, References, Citations: LEED-NC/S 2008 IEQc8.1 has some basic requirements that have been utilized for years, but since it's optional, not everyone can or will comply.

808.3.1.1 Sidelighting (prescriptive)

Recommendation: Make optional and move to Appendix A

Justification: Good practice.

ASHRAE 189.1 Comparison: 8.4.1 ASHREA defines effective side lighting aperture only. ASHREA provides similar to IgCC daylight area description in Definitions section.

Notes, References, Citations: LEED-NC/S 2008 IEQc8.1 has some basic requirements that have been utilized for years, but since it's optional, not everyone can or will comply.

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808.3.1.2 Top-lighting (prescriptive)

Recommendation: Make optional and move to Appendix A

Justification: Good practice.

ASHRAE 189.1 Comparison: 8.3.4 ASHREA provides similar to IgCC daylight area description in Definitions section.

Notes, References, Citations: LEED-NC/S 2008 IEQc8.1 has some basic requirements that have been utilized for years, but since it's optional, not everyone can or will comply.

808.3.2 Daylight performance requirements.

808.3.2.1 Morning Illumination.

808.3.2.2 Afternoon illumination.

808.3.2.3 Daylight analysis.

Recommendation: Make optional and move to Appendix A.

Allow alternative for compliance with 808.3.2.1 and 808.3.2.2 and add the following language:

Or Daylight autonomy based on occupancy from 6 am till 8 pm and calculated for a minimum 28 foot-candles (300 lux) lighting level at 30 inches (750mm) above the floor shall be not less than 50%.

Justification: Good practice. Simulation requirements will be difficult to review and enforce by local jurisdiction. Daylight simulations are critical part of innovative optimization of building performance. But moment-in-time based metrics analysis is not the latest or most accurate or most flexible tool used by AEC industry today. Dynamic Metrics of Annual Daylight Autonomy (DA) is another more advanced method that should be considered as an approved submittal method.

Additional language recommendations for time of day are based on IESNA recommendations. This additional language will allow for the flexibility necessary for innovative solutions and will align Code compliance metrics with design tools currently used by industry professionals.

ASHRAE 189.1 Comparison: 8.5 ASHRAE Calls for moment -in-time based lighting metrics analysis at noon on spring equinox. The simulation applies to 75% of daylight area. But it seems that ASHREA standard does not require specific amount of daylight area based on total building area. Daylight requirements levels are similar to IgCC. ASHRAE calls for specific direct sun limitation (8.5.1.2) - aka glare control.

Notes, References, Citations: LEED-NC/S 2008 IEQc8.1 has some basic requirements that have been utilized for years, but since it's optional, not everyone can or will comply.

808.4 Sky types.

808.4.1 United States sky types.

808.4.2 International sky types.

Recommendation: Make optional and move to Appendix A

Justification: Good practice. See comments for 808.

ASHRAE 189.1 Comparison: 8.5.1.1

Notes, References, Citations: None

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2012 – IgCC Appendix A Section A108 – Indoor Environmental Quality and Comfort Project Electives (original)
<p>Recommendation: Maintain</p>
<p>Justification: Good practice – offers options to project teams</p>
<p>Notes, References, Citations: The following list replicates the Project Electives set forth in Appendix A</p>
<p>A102.2 Strike</p>
<p>A108.1 VOC Emissions VOC emissions project electives. Sections A108.2 through A108.5 shall be considered to be separate project electives. The electives shall be cumulative and compliance with each project elective shall be recognized individually.</p>
<p>A108.2 VOC Emissions - flooring Flooring material project elective. Where projects are intended to qualify for a “flooring material” project elective, all flooring installed within the interior of the building shall comply with Section 806.4 or shall be one or more of the following flooring materials that are deemed to comply with VOC emission limits:</p> <ol style="list-style-type: none">1. Ceramic and concrete tile2. Clay pavers3. Concrete4. Concrete pavers5. Metal6. Organic-free, mineral-based
<p>A108.3 VOC Emissions – ceiling systems Ceiling materials project elective. Where projects are intended to qualify for a “ceiling materials” project elective, all ceiling systems shall comply with Section 806.5 or shall be one or more of the following ceiling systems that are deemed to comply with VOC emission limits:</p> <ol style="list-style-type: none">1. Ceramic tile2. Clay masonry3. Concrete4. Concrete masonry5. Metal6. Organic-free, mineral-based
<p>A108.4 VOC Emissions – wall systems Wall materials project elective. Where projects are intended to qualify for a “wall materials” project elective, all wall systems shall comply with Section 806.5 or shall be one or more of the following wall systems that are deemed to comply with VOC emission limits:</p> <ol style="list-style-type: none">1. Ceramic tile2. Clay masonry3. Concrete4. Concrete masonry5. Metal6. Organic-free, mineral-based

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A108.5 Total VOC Limit

Total VOC limit project elective. Where projects are intended to qualify for a “total VOC limit” project elective in accordance with a minimum of 50 percent of all adhesives and sealants, architectural paints and coatings, flooring, acoustical ceiling tiles and wall systems and insulation shall have a Total Volatile Organic Compounds (TVOCs) emission limit of $\leq 500 \text{ ug/m}^3$. The test methodology used to determine compliance shall be from CDPH/EHLB/Standard Method V.1.1. The emissions testing shall be performed by a laboratory that has the CDPH/EHLB/Standard Method V.1.1 test methodology in the scope of its ISO 17025 Accreditation.

A108.6 Views to Building Exterior

Views to building exterior project elective. Where projects are intended to qualify for a “views to building exterior” project elective in accordance with Section A108.6, not less than 50 percent of the net floor area shall have a direct line of sight to the exterior through clear vision glazing. A total of not less than 45 square feet (4.18 m²) of clear vision glazing in the exterior wall or roof shall be visible. The direct line of sight shall originate at a height of 42 inches (1067 mm) above the finished floor of the space, shall terminate at the clear vision glazing in the exterior wall or roof, and shall be less than 40 feet (12 192 mm) in length. Exception: Where the direct line of sight is less than 25 feet (7620 mm) in length, a total of not less than 18 square feet (1.67 m²) of clear vision glazing in the exterior wall or roof shall be visible.

2012 – IgCC Appendix A Section A108 – Project Electives Supplemental – Part 1
Indoor Environmental Quality and Comfort

Recommendation: Maintain as written.

Justification: Good practice – offers options to project teams.

Notes, References, Citations: The following list replicates the Jurisdictional Electives set forth in Table 302.1

New A108.7 (Formerly 804.2) Post-construction, pre-occupancy baseline IAQ testing.

Where this section is indicated to be applicable in Table 302.1, and after all interior finishes are installed, the building shall be tested for indoor air quality and the testing results shall indicate that the levels of VOCs meet the levels detailed in Table 804.2 using testing protocols in accordance with ASTM D 6196, ASTM D 5466, ASTM D 5197, ASTM D 6345, and ISO 7708. Test samples shall be taken in not less than one location in each 25,000 square feet (1860 m²) of floor area or in each contiguous floor area.

Exceptions:

1. Group F, H, S and U occupancies shall not be required to comply with this section.
2. A building shall not be required to be tested where a similarly designed and constructed building as determined by the *code official*, for the same owner or tenant, has been tested for indoor air quality and the testing results indicate that the level of VOCs meet the levels detailed in Table 804.2.
3. Where the building indoor environment does not meet the concentration limits in Table 804.2 and the tenant does not address the air quality issue by mitigation and retesting, the building shall be flushed-out by supplying continuous ventilation with all air-handling units at their maximum outdoor air rate for at least 14 days while maintaining an internal temperature of at least 60°F (15.6°C), and relative humidity not higher than 60 percent. Occupancy shall be permitted to start 7 days after start of the flush-out, provided that the flush-out continues for the full 14 days.

TABLE 804.2 MAXIMUM CONCENTRATION OF AIR POLLUTANTS

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807.1 Sound transmission and sound levels.

Where required by Table 302.1, buildings and tenant spaces shall comply with the minimum sound transmission class and maximum sound level requirements of Sections 807.2 through 807.5.2.

Exception: The following buildings and spaces need not comply with this section:

1. Building or structures that have the interior environment open to the exterior environment.
2. Parking structures.
3. Concession stands and toilet facilities in Group A-4 and A-5 occupancies.

807.2 Sound transmission.

Sound transmission classes established by laboratory measurements shall be determined in accordance with ASTM E 413 based on measurements in accordance with ASTM E 90. Sound transmission classes for concrete masonry and clay masonry assemblies shall be calculated in accordance with TMS 0302 or determined in accordance with ASTM E 413 based on measurements in accordance with ASTM E 90. Field measurements of completed construction, if conducted, shall be in accordance with ASTM E 336 where conditions regarding room size and absorption required in ASTM E 336 are met.

New A108.8 (Formerly 807.2.1) Interior sound transmission.

Wall and floor-ceiling assemblies that separate Group A and F occupancies from one another or from Group B, I, M or R occupancies shall have a sound transmission class (STC) of not less than 60 or an apparent sound transmission class (ASTC) of not less than 55 if the completed construction is field tested. Wall and floor-ceiling assemblies that separate Group B, I, M or R occupancies from one another shall have a sound transmission class (STC) of not less than 50 or an apparent sound transmission class (ASTC) of not less than 45 if the completed construction is field tested. Wall and floor-ceiling assemblies that separate Group R condominium occupancies from one another or from other Group B, I, M or R occupancies shall have a sound transmission class (STC) of not less than 55 or an apparent sound transmission class (ASTC) of not less than 50 if the completed construction is field tested.

Exception: This section shall not apply to wall and floor-ceiling assemblies enclosing:

1. Public entrances to tenants of covered and open mall buildings.
2. Concession stands and lavatories in Group A-4 and A-5 occupancies.
3. Spaces and occupancies that are accessory to the main occupancy.

A108.9 (Formerly 807.2.2) Mechanical and emergency generator equipment and systems.

Wall and floor-ceiling assemblies that separate a mechanical equipment room or space from the remainder of the building shall have a sound transmission class (STC) of not less than 50 or an apparent sound transmission class (ASTC) of not less than 45 if the completed construction is field tested. Wall and floor-ceiling assemblies that separate a generator equipment room or space from the remainder of the building shall have a sound transmission class (STC) of not less than 60 or an apparent sound transmission class (ASTC) of not less than 55 if the completed construction is field tested.

807.3 Sound levels.

The design and construction of mechanical and electrical generator systems and of walls and floor-ceilings separating such equipment from the outdoors or other building space shall achieve sound levels not greater than specified in Sections 807.3.1 and 807.3.2 during the normal operation of mechanical equipment and generators. Electrical generators used only for emergencies are exempt from the limits on sound levels within the building and need only meet daytime limits for sound-reaching boundaries. Where necessary, walls and floor-ceiling assemblies with sound transmission class (STC) ratings greater than specified in Section 807.2.2 shall be used to meet this requirement.

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A108.10 (Formerly 807.3.1) Sound of mechanical and electrical generator equipment outside of buildings.

Where mechanical equipment or electrical generators are located outside of the building envelope or their sound is exposed to the exterior environment, the sound reaching adjacent properties shall comply with all applicable

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New A108.12 (Formerly 807.4) Structure-borne sounds.

Floor and ceiling assemblies between dwelling rooms or dwelling units and between dwelling rooms or dwelling units and public or service areas within the structure in occupancies classified as Group A1, A2, A3, B, E, I, M or R shall have an impact insulation classification (IIC) rating of not less than 50 where laboratory-tested and 45 where field-tested when tested in accordance with ASTM E 492. New laboratory tests for impact insulation class (IIC) of an assembly are not required where the IIC has been established by prior tests.

807.5 Special inspections for sound levels.

An approved agency, funded by the building owner, shall furnish report(s) of test findings indicating that the sound level results are in compliance with this section, applicable laws and ordinances, and the construction documents. Discrepancies shall be brought to the attention of the design professional and *code official* prior to the completion of that work. A final testing report documenting required testing and corrections of any discrepancies noted in prior tests shall be submitted at a point in time agreed upon by the building owner, or building owner's agent, design professional, and the *code official* for purposes of demonstrating compliance.

New A108.13 (Formerly 807.5.1) Testing for mechanical and electrical generator equipment outside of buildings.

Special inspections shall be conducted in accordance with Section 903.1 to demonstrate compliance with the requirements of Section 807.3.1. Testing shall be conducted following the complete installation of the equipment or generators, the installation of sound reduction barriers, and balancing and operation of the equipment or generators. Testing shall be at locations representing the four cardinal directions from the face of the project building. Such testing shall demonstrate that the equipment is capable of compliance with the night-time limits under normal night-time operating conditions, and if higher sound levels are possible during the daytime, compliance with the daytime limits shall also be demonstrated.

New A108.14 (Formerly 807.5.2) Testing for building system background noise.

Special inspections shall be conducted in accordance with Section 903.1 to demonstrate compliance with the requirements of Section 807.3.2. Testing shall be executed within not less than 50 percent of the total number of rooms contained in a building or structure of the types listed in Table 807.3.2 for the given occupancy in accordance with Table 903.1. Testing shall occur following the complete installation of the equipment and systems, the installation of any sound reduction barriers, and balancing and operation of the equipment and systems.

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Recommendation: Include as described below – unless otherwise noted these are maintained as written.

Justification: Good practice – offers options to project teams.

Notes, References, Citations: The following list includes the requirements that are recommended to be moved to Appendix A – Project Electives.

New A108.15 (Formerly 803.2) Thermal environmental conditions for human occupancy. Buildings shall be designed in compliance with ASHRAE 55 Sections 6.1 "Design" and 6.2 "Documentation". Exception: Spaces with special requirements for processes, activities, or contents that require a thermal environment outside of that which humans find thermally acceptable, such as food storage, natatoriums, shower rooms, saunas and drying rooms.

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New A108.16 (As recommended under 803.4 above with text per ASHRAE 189.1, 8.3.1.5)

Building Entrances. All building entrances shall employ an entry mat system that shall have a scraper surface, an absorption surface, and a finishing surface. Each surface shall be a minimum of the width of the entry opening, and the minimum length is measured in the primary direction of travel.

Exceptions:

Entrances to individual dwelling units.

Length of entry mat surfaces is allowed to be reduced due to a barrier, such as a counter, partition, or wall, or local regulations prohibiting the use of scraper surfaces outside the entry. In this case entry mat surfaces shall have a minimum length of 3 ft (1 m) of indoor surface, with a minimum combined length of 6 ft (2 m).

8.3.1.5.1 Scraper Surface. The scraper surface shall comply with the following:

- a. Shall be the first surface stepped on when entering the building.
- b. Shall be either immediately outside or inside the entry.
- c. Shall be a minimum of 3 ft (1 m) long.
- d. Shall be either permanently mounted grates or removable mats with knobby or squeegee-like projections.

8.3.1.5.2 Absorption Surface. The absorption surface shall comply with the following:

- a. Shall be the second surface stepped on when entering the building.
- b. Shall be a minimum of 3 ft (1 m) long, and made from materials that can perform both a scraping action and a moisture wicking action.

8.3.1.5.3 Finishing Surface. The finishing surface shall comply with the following:

- a. Shall be the third surface stepped on when entering the building.
- b. Shall be a minimum of 4 ft (1.2 m) long, and made from material that will both capture and hold any remaining particles or moisture.

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807.5 Special Inspections for sound levels.

New A108.17 (Formerly 807.5.3) Separating assemblies.

Wall and floor-ceiling assemblies that separate a mechanical or emergency generator equipment room or space from the remainder of the building shall have a sound transmission class (STC) of not less than 60 determined in accordance with ASTM E 90 and ASTM E 413, or for concrete masonry and clay masonry assemblies as calculated in accordance with TMS 0302 or as determined in accordance with ASTM E 90 and ASTM E 413.

New A108.18 (Formerly 807.5.4) HVAC background sound.

HVAC system caused background sound levels for all modes of operation within rooms shall be in accordance with the lower and upper noise criteria (NC) limits as shown in Table 807.3.2. Special inspections shall be required and conducted in accordance with Section 903.1 in order to demonstrate compliance.

807.6 Special inspections for sound transmission.

An approved agency, employed by the building owner, shall furnish report(s) of test findings indicating that the results are in compliance with this section and the construction documents. Discrepancies shall be brought to the attention of the design professional and *code official* prior to the completion of that work. A final testing report documenting required testing and corrections of any discrepancies noted in prior tests shall be submitted at a point in time agreed upon by the building owner, or building owner's agent, design professional, and the *code official* for purposes of demonstrating compliance.

Exception: Test reports are not required for *approved* assemblies with an established sound transmission class (STC) rating.

New A108.19 (Formerly 807.6.1) Testing for mechanical and emergency generator equipment outside of buildings.

In accordance with Section 807.3.1, all mechanical and emergency generator equipment shall be field tested in accordance with Table 903.1. Testing shall be conducted following the complete installation of the equipment or generators, the installation of sound reduction barriers, and balancing and operation of the equipment or generators. Testing shall be at locations representing the four cardinal directions from the face of the project building. Such testing shall occur on a Tuesday, Wednesday or Thursday at both the day and night times within the periods shown in Table 807.3.1.

New A108.20 (Formerly 807.6.2) Testing for building system background noise.

Testing shall be executed in accordance with Section 807.3.1 within not less than 50 percent of the total number of rooms contained in a building or structure, exclusive of closets and storage rooms less than 50 square feet (4.65 m²) in area, and exclusive of toilet facilities in accordance with Table 903.1. Testing shall occur following the complete installation of the equipment and systems, the installation of any sound reduction barriers, and balancing and operation of the equipment and systems.

808.1 General.

Fenestration shall be provided in building roofs and walls in accordance with Sections 808.2 and 808.3. Interior spaces shall be planned to benefit from exposure to the natural light offered by the fenestration in accordance with this section.

New A108.21 (Formerly 808.1.1) Fenestration obstructions.

Advertisements or displays affixed or applied to a fenestration, or supported by the building shall not reduce daylighting below the levels prescribed herein.

Exception: The ground floor and the story immediately above the ground floor.

NOTE: Recommendation is that all following paragraphs related to Daylighting be included in Appendix A therefore "Applicability" no longer applies.

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New A108.22 (Formerly 808.3) Daylit area of building spaces.

In buildings not greater than two stories above grade, not less than 50 percent of the net floor area shall be located within a daylit area. In buildings three or more stories above grade, not less than 25 percent of the net floor area shall be located within a daylit area. Buildings required to have more than 25,000 square feet (2323 m²) of daylit area shall comply with Section 808.3.2. All other buildings shall comply with either Section 808.3.1 or Section 808.3.2.

Exceptions:

1. For daylight areas where the height of existing adjacent structures above the window is at least twice the distance between the window and the adjacent structures, measured from the top of the glazing; and
2. For where the simulation demonstrates that existing adjacent structures preclude meeting the illuminance requirements,

A108.23 (Formerly 808.3.1) Daylight prescriptive requirements.

Daylit areas shall comply with Section 808.3.1.1 or 808.3.1.2. For determining the total daylit area, any overlapping daylit areas shall be counted only once.

The total daylight area shall be the sum of the area of all sidelighting daylight zones and the area of all toplighting zones, except that sidelighting daylight zones shall not be included in the calculation of the area of toplighting daylight areas.

A108.24 (Formerly 808.3.1.1) Sidelighting (prescriptive)

The daylit area shall be illuminated by fenestration that complies with Table 808.3.1.1 and Figure 808.3.1.1(4). Where fenestration is located in a wall, the daylit area shall extend laterally to the nearest 56-inch-high (1422 mm) partition, or up to 1.0 times the height from the floor to the top of fenestration facing within 45 degrees (0.785 rad) of east or west or up to 1.5 times the height from the floor to the top of all other fenestration, whichever is less, and longitudinally from the edge of the fenestration to the nearest 56-inch-high (1422 mm) partition, or up to 2 feet (610 mm), whichever is less, as indicated in Figure 808.3.1.1(1). Where fenestration is located in a rooftop monitor, the daylit area shall extend laterally to the nearest 56-inch-high (1422 mm) partition, or up to 1.0 times the height from the floor to the bottom of the fenestration, whichever is less, and longitudinally from the edge of the fenestration to the nearest 56-inch-high (1422 mm) partition, or up to 0.25 times the height from the floor to the bottom of the fenestration, whichever is less, as indicated in Figures 808.3.1.1(2) and 808.3.1.1(3).

New A108.25 (Formerly 808.3.1.2) Toplighting (prescriptive)

The daylit area shall be illuminated by a roof fenestration assembly such as a skylight, sloped glazing or tubular daylighting device that complies with Table 808.3.1.1 and Figure 808.3.1.2. The daylit area extends laterally and longitudinally beyond the glazed opening of the roof fenestration assembly to the nearest 56-inch-high (1422 mm) partition, or up to 0.7 times the height from the floor to the bottom of the rough opening of the daylighting well, whichever is less, as indicated in Figure 808.3.1.2.

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New A108.26 (Formerly 808.3.2) Daylight performance requirements.

Each daylit area shall comply with the requirements of either Section 808.3.2.1 or 808.3.2.2. Daylight analysis shall be conducted in accordance with Section 808.3.2.3.

808.3.2.1 Morning illumination.

Not less than 28 foot-candles (300 lux) and not more than 418 foot-candles (4500 lux) of natural light shall be available at a height of 30 inches (750 mm) above the floor 3 hours before the peak solar angle on the spring equinox.

Or Daylight autonomy based on occupancy from 6 am till 8 pm and calculated for a minimum 28 foot-candles (300 lux) lighting level at 30 inches (750mm) above the floor shall be not less than 50%.

808.3.2.2 Afternoon illumination.

Not less than 28 foot-candles (300 lux) and not more than 418 foot-candles (4500 lux) of natural light shall be available at a height of 30 inches (750 mm) above the floor 3 hours after the peak solar angle on the spring equinox.

Or Daylight autonomy based on occupancy from 6 am till 8 pm and calculated for a minimum 28 foot-candles (300 lux) lighting level at 30 inches (750mm) above the floor shall be not less than 50%.

808.3.2.3 Daylight analysis.

A daylight analysis shall be performed that complies with the following:

1. Sky conditions shall be assumed to be clear.
2. Address the effects of exterior shading devices, buildings, structures, and geological formations on the fenestration of the proposed building and on the ground and other light reflecting surfaces. Include the effects of movable exterior fenestration shading devices. The configuration of fenestration with automatically controlled variable transmittance shall be adjusted to accurately represent the control system operation.
3. Exclude the effects of interior furniture systems, shelving, and stacks.
4. Use the actual reflectance characteristics of all materials.
5. Where blinds, shades and other movable interior fenestration shading devices are included in the analysis and the exact properties of such devices cannot be accurately modeled, such devices shall be assumed to be completely diffusing, with a visible transmittance of 5 percent for fabric shades, and 20 percent for horizontal or vertical blinds.
6. Calculation points shall be spaced not more than 39.4 inches (1 m) by 39.4 inches (1 m). The calculation grid shall start within 20 inches (508 mm) of each wall or partition.
7. Where details about the window framing, mullions, wall thickness and well depth cannot be included in the model, the visible transmittance of all fenestration shall be reduced by 20 percent.

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808.4 Sky types.

Sky types as described in Section 808.4.1 or 808.4.2 shall be used in determining the applicable effective aperture in Table 808.3.1.1

808.4.1 United States sky types.

All states, counties, and territories shall be sky type B, except as named herein. The states and counties in sky type A shall be: all of Arizona; in Nevada the counties of Churchill, Lincoln, Nye, Washoe, and counties south; in New Mexico the counties of Lincoln, Otero, Sandoval, San Juan, Santa Fe, Torrance and counties south; in Texas the counties of Hudspeth, El Paso, and Jeff Davis; in Utah the counties of Iron, Kane, and Washington; and in California all counties except Del Norte, Siskiyou, Modoc, Humboldt, Trinity, and Mendocino. Alaska shall be sky type C.

808.4.2 International sky types.

All international locations shall be sky type B, except as follows: locations with an annual average of more than 75 percent sunshine during daytime hours shall be sky type A, and locations with an annual average of less than 45 percent sunshine during daytime hours shall be sky type C.

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Summary: It is recommended to better align the requirements and standards of the IgCC Chapter 9 and ASHRAE 189.1 Chapter 10 where they differ. It is further recommended that the lesser of the requirements and standards be adopted during the first adoption cycle. It's recommended that Sections 604.4, 707.15.1 and 708.13.8 be moved to Appendix A for optional compliance (with some suggested modifications). These sections address very important issues, but due to burdens required to AHJ via special inspections, complex or cumbersome calculations and diagrams, and the lack of a way for the AHJ to evaluate and rule on them contributes to the recommendation to make them optional.

901.1 Scope. The provisions of this chapter are intended to facilitate the pre- and post-occupancy commissioning, operation and maintenance of buildings constructed in accordance with this code in a manner that is consistent with the intent of other provisions of this code, and to further that goal through the education of building owners and maintenance personnel with regard to related best operating and management practices.

Recommendation: Maintain as written

Justification: Good practice; pre-commissioning will have little to no impact; post-commissioning while a good practice may have far reaching consequences.

ASHRAE 189.1 Comparison: Chapter 10, 10.1 Scope is comparable

Notes, References, Citations: Best practices.

902.1 Approved agency. An approved agency shall provide all of the information necessary for the code official to determine that the agency meets the applicable requirements. The code official shall be permitted to be the approved agency.

Recommendation: Delete and replace with IBC definition: **[A] APPROVED AGENCY.** An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved.

Justification: Last sentence implies that the AHJ may take on an unnecessary role.

ASHRAE 189.1 Comparison: No direct reference to approved agency in ASHRAE 189.1; there is no conflict.

Notes, References, Citations: Best practices.

902.1.1 Independence. An approved agency shall be objective, competent and independent from the contractor responsible for the work being inspected. The agency shall also disclose possible conflicts of interest so that objectivity can be confirmed.

Recommendation: Maintain as written

Justification: An approved agency shall be an independent 3rd party with no stake in the project.

ASHRAE 189.1 Comparison: No direct reference to independence of approved agency in ASHRAE 189.1; there is no conflict.

Notes, References, Citations: Best practices.

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902.1.2 Equipment. An approved agency shall have adequate equipment to perform the required commissioning. The equipment shall be periodically calibrated.

Recommendation: Maintain as written

Justification: Good practice

ASHRAE 189.1 Comparison: No direct reference to equipment in ASHRAE 189.1; there is no conflict.

Notes, References, Citations: Best practices.

902.1.3 Personnel. An approved agency shall employ experienced personnel educated in conducting, supervising and evaluating tests and commissioning.

Recommendation: Maintain as written

Justification: Good practice

ASHRAE 189.1 Comparison: No direct reference to personnel of approved agency in ASHRAE 189.1; there is no conflict.

Notes, References, Citations: Best practices.

903.1 General. Where application is made for construction as described in this section, the ~~registered design professional in responsible charge or~~ approved agency shall perform commissioning during construction and after occupancy as required by Table 903.1. Where Table 903.1 specifies that commissioning is to be done on a periodic basis, the ~~registered design professional in responsible charge shall provide a schedule of periodic commissioning with the submittal documents that shall be reviewed and approved by the code official~~

The approved agency shall be qualified and shall demonstrate competence, to the satisfaction of the code official, for the commissioning of the particular type of construction or operation. The registered design professional in responsible charge and engineers of record involved in the design of the project are permitted to act as the approved agency provided those personnel meet the qualification requirements of this section to the satisfaction of the code official. The approved agency shall provide written documentation to the code official demonstrating competence and relevant experience or training. Experience or training shall be considered relevant where the documented experience or training is related in complexity to the same type of commissioning activities for projects of similar complexity and material qualities.

Recommendation: ~~Delete - the registered design professional in responsible or;~~ ~~Delete - the registered design professional in responsible charge shall provide a schedule of periodic commissioning with the submittal documents that shall be reviewed and approved by the code official.~~ **Add –** approved agency shall provide a schedule of periodic commissioning with the submittal documents that shall be reviewed and approved by the registered design professional in responsible charge.

Justification: The approved agency shall be responsible for commissioning. The registered design professional in responsible charge shall provide review and approval of the schedule of periodic commissioning.

ASHRAE 189.1 Comparison: **commissioning authority (CxA):** An entity identified by the owner who leads, plans, schedules, and coordinates the commissioning team to implement the building commissioning process. (See commissioning process)

Notes, References, Citations: Best practices.

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903.1.1 Preoccupancy report requirement. The approved agency shall keep records of the commissioning required by Table 903.1. The approved agency shall furnish commissioning reports to the owner and the registered design professional in responsible charge and, upon request, to the code official. Reports shall indicate that work was or was not completed in conformance to approved construction documents. Discrepancies shall be brought to the immediate attention of the contractor for correction. Where discrepancies are not corrected, they shall be brought to the attention of the owner, code official and to the registered design professional in responsible charge prior to the completion of that phase of the work. Prior to the issuance of a Certificate of Occupancy, a final commissioning report shall be submitted to and accepted by the code official.

Recommendation: Maintain as written

Justification: This is similar requirement to special inspections report submitted to code official.

ASHRAE 189.1 Comparison: 10.3.1.2.2 Activities Prior to Building Occupancy: are comparable in scope

Notes, References, Citations: Best practices.

903.1.2 Post-occupancy report requirement. Post-occupancy commissioning shall occur as specified in the applicable sections of this code. A post-occupancy commissioning report shall be provided to the owner within 30 months after the Certificate of Occupancy is issued for the project and shall be made available to the code official upon request.

Recommendation: Maintain as written

Justification: Good practice, may be difficult for some projects

ASHRAE 189.1 Comparison: 10.3.1.2.3 Post-Occupancy Activities: are comparable in scope

Notes, References, Citations: Appendix D: Unknown at this time what the AHJ will require if post-commissioning fails.

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TABLE 903.1
COMMISSIONING PLAN

CONSTRUCTION OR SYSTEM REQUIRING VERIFICATION	PREOCCUPANCY	POST-OCCUPANCY	METHOD	OCCURRENCE		SECTION / REFERENCED STANDARD
				Preoccupancy	Post-occupancy	
Chapter 4: Site Development and Land Use						
Landscape irrigation systems	X		Field inspection	Installation		404.1
Storm water management system operation	X	X	Field inspection	Installation	Annually	Ch 19-13 County Code
Site lighting	X		Testing and report	Installation		409
Chapter 8: Energy						
Energy consumption monitoring targeting and reporting						
a. monitoring system	X	None	Inspection and verification	During construction and prior to occupancy	None	603.610.5
b. calibration	X	X	Testing and review and evaluation of test reports	During commissioning	Annually	603.610.5
Mechanical systems completion-all buildings						
a. air system balancing-provide the means for system balancing	X	None	Inspection and verification	During construction and prior to occupancy	None	611.1.2.1 and through reference to IEC C.
b. Hydronic system balancing-provide means for system balancing	X	None	Inspection and verification	During construction and prior to occupancy	None	611.1.2.2 and through reference to IEC C.
c. Mechanical systems manuals-construction documents to require O & M. manual	X	None	Verification of construction documents	Prior to use and occupancy permit	None	611.1.5.2
Mechanical systems-buildings over 5000 ft.² total building or area						
a. Commissioning required and noted in plans and specifications	X	None	Verification of construction documents	Plan review		611.1
b. Documentation required commissioning outcomes	X	None	Verification with the building owner	Subsequent to completion of all commissioning activities		611.1
c. Preparation and availability of a commissioning plan	X	None	Verification with the RDP or commissioning agent	Between plan review and commissioning initiation		611.1.1
d. Balance HVAC systems(both air and hydronic)	X	X	HVAC system installer/contractor or commissioning agent	After installation of HVAC systems and prior to occupancy		611.1.2
e. Functional performance testing of HVAC equipment	X	X	HVAC system installer/contractor or commissioning agent	After installation of HVAC systems and prior to occupancy		611.1.3
f. Functional performance testing of HVAC controls and control systems	X	X	HVAC system installer/contractor or commissioning agent	After installation of HVAC systems and prior to occupancy		611.1.3.2
g. Preparation of preliminary commissioning report	X	None	Commissioning agent	None	Subsequent to commissioning	611.1.4
h. Acceptance of HVAC systems and equipment/system verification report	X	None	Building owner	None	Letter verifying receipt of the commissioning report	611.1.4.1
i. Preparation and distribution of final HVAC system completion documentation that construction documents require drawings manuals balancing reports and commissioning report be available to the building owner	None	X	RDP, contractor or commissioning agent	None	90 days after final certificate of occupancy	611.1.5

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Chapter 6: Lighting						
Auto demand reduction control system functionality	X	X	Functional testing	Final inspection	18 to 24 months	604.4
Specified transformer nameplate deficiency rating	X	None	Field inspection	Final inspection	None	608.8.11
Verification of lamp	X	X	Field inspection	Final inspection	18 to 24 months	608.10
Verification of ballast	X	None	Field inspection	Final inspection	None	608.10
Lighting controls						
a. Installation	X	None	Field inspection	Post installation	None	608.11
b. Calibration	X	X	System installer/contractor or commissioning agent	Post installation	18 to 24 months	611.3.3
Chapter 7: Water Resource Conservation, Quality and Efficiency						
Appliances	X	None				702.6
Hot water distribution	X	None				702.8
Cooling tower performance		X				703.7.7
Metering	X	None				705.1.1
Chapter 8: Indoor Environmental Quality and Comfort						
Building construction, feature, operations and maintenance facilitation						
Air handling system access	X	X	Field inspection and verification	During construction and prior to occupancy	18 to 24 months	802.2
Air handling system builders	X	X	Field inspection and verification	During construction and prior to occupancy	18 to 24 months	802.3
HVAC systems						
Temperature and humidity in occupied space		X	Field inspection and verification		18 to 24 months	803.2
Specific indoor air quality and pollution control measures						
Listing, installation and venting of fireplaces and combustion appliance	X		Field inspection and verification	During construction and prior to occupancy		804.1

Recommendation: Modify move the following to appendix A: natural resources and baseline conditions of building site (401.2), topsoil and vegetation protection measures; setbacks from protected areas (405.1.1), imported soils (405.1.3), soil restoration and reuse (405.1.4), erosion and sediment control (405.1.1), hardscape and shading provided by structures and vegetation (408.2), vegetated roofs (408.3.2), auto demand reduction (604.4), and rainwater and gray water (707.15.1, 708.13.8)

Justification: Good practice

ASHRAE 189.1 Comparison: No direct reference.

Notes, References, Citations: Best practices.

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904.1 General. Building operations and maintenance documents in accordance with Section 904.3 shall be submitted to the owner prior to the issuance of the Certificate of Occupancy. Record documents shall be in accordance with Section 904.2. The building owner shall file a letter with the code official certifying the receipt of record documents and building operations and maintenance documents. At least one copy of these materials shall be in the possession of the owner and at least one additional copy shall remain with the building throughout the life of the structure.

Recommendation: Maintain as written

Justification: Good practice

ASHRAE 189.1 Comparison: Chapter 10 similar requirements

Notes, References, Citations: Best practices

904.2 Record documents. The cover sheet of the record documents for the project shall clearly indicate that at least one copy of the materials shall be in the possession of the owner. Record documents shall include all of the following:

1. Copies of the approved construction documents, including plans and specifications.
2. As-built plans and specifications indicating the actual locations of piping, ductwork, valves, controls, equipment, access panels, lighting and other similar components where they are concealed or are installed in locations other than those indicated on the approved construction documents.
3. For sites that have previously been a brownfield, or required environmental corrective action, remediation or restoration at the federal, state or local level, copies of engineering and institutional control information shall be provided.
4. A copy of the Certificate of Occupancy.

Recommendation: Maintain as written

Justification: Good practice

ASHRAE 189.1 Comparison: Chapter 10 similar requirements

Notes, References, Citations: Best practices

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904.3 Building operations and maintenance documents. The building operations and maintenance documents shall consist of manufacturer's specifications and recommendations, programming procedures and data points, narratives, and other means of illustrating to the owner how the building, site and systems are intended to be maintained and operated. The following information shall be included in the materials, as applicable to the specific project:

1. Directions to the owner or occupant on the manual cover sheet indicating that at least one copy of the materials shall be in the possession of the owner or occupant.
2. Operations and maintenance manuals for equipment, products and systems installed under or related to the provisions of Chapter 4 including, but not limited to, the following, as applicable:
 - 2.1. Vegetative shading, vegetative roofs and natural resource protections and setbacks.
 - 2.2. Water-conserving landscape and irrigation systems.
 - 2.3. Stormwater management systems.
 - 2.4. Permanent erosion control measures.
 - 2.5. Landscape or tree management plans.
3. Operations and maintenance documents for materials, products, assemblies and systems installed under or related to the provisions of this code for material resource conservation in accordance with Chapter 5 including, but not limited to, the following, as applicable:
 - 3.1. Care and maintenance instructions and recommended replacement schedule for flooring, including, but not limited to, carpeting, walk-off mats and tile.
 - 3.2. Care and maintenance instructions for natural materials including, but not limited to, wood, bio-based materials and stone.
 - 3.3. Available manufacturer's instructions on maintenance for:
 - 3.3.1. Exterior wall finishes.
 - 3.3.2. Roof coverings.
 - 3.3.3. Exterior doors, windows and sky-lights.
 - 3.4. Information and recommended schedule for required routine maintenance measures, including, but not limited to, painting and refinishing.

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4. Operations and maintenance documents for equipment, products and systems installed under or related to the provisions of this code for energy conservation in accordance with Chapter 6 including, but not limited to, the following:

- 4.1. Heating, ventilating and air-conditioning systems including:
 - 4.1.1. Recommended equipment maintenance schedule.
 - 4.1.2. Air filters and fluid filters, including recommended replacement schedule and materials.
 - 4.1.3. Time clocks, including settings determined during commissioning.
 - 4.1.4. Programmable controls and thermostats, including settings determined during commissioning.
- 4.2. Domestic hot water systems including performance criteria and controls.
- 4.3. Building thermal envelope systems including:
 - 4.3.1. Glazing systems inspection schedule.
 - 4.3.2. Performance criteria for replacements and repairs.
 - 4.3.3. Information and recommended schedule on required routine maintenance measures, including but not limited to, sealants, mortar joints and screens.
- 4.4. Electrical and lighting systems including:
 - 4.4.1. Technical specifications and operating instructions for installed lighting equipment.
 - 4.4.2. Luminaire maintenance and cleaning plan.
 - 4.4.3. Lamp schedule, recommended relamping plan, and lamp disposal information.
 - 4.4.4. Programmable and automatic controls documentation, including settings determined during commissioning.
 - 4.4.5. Occupant sensor and daylight sensors documentation, including settings determined during commissioning.
- 4.5. Automatic demand reduction systems.

5. Operations and maintenance documents for equipment, products and systems installed under or related to the provisions of this code for water conservation in accordance with Chapter 7, including, but not limited to the following:

- 5.1. Domestic fixtures.
- 5.2. Water-regulating devices including faucets and valves.
- 5.3. Irrigation and rainwater and gray water catchment.

6. Operations and maintenance documents for equipment products and systems under or related to the provisions of this code for indoor environmental quality in accordance with Chapter 8, including, but not limited to, the following:

- 6.1. Humidification/dehumidification.
- 6.2. Green cleaning products, procedures and techniques.
- 6.3. Recommended window cleaning schedule.
- 6.4. Ventilation controls.
- 6.5. Floor finishes.

6.6. Fireplaces and combustion appliances.

Recommendation: Maintain as written

Justification: Good practice

ASHRAE 189.1 Comparison:

Notes, References, Citations: 189.1 not as comprehensive

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2012 – IgCC Appendix A Section A106 – Energy Conservation, Efficiency and Earth Atmospheric Quality
<p>Recommendation: Maintain</p> <p>Justification: Good practice – offers options to project teams</p> <p>Notes, References, Citations: The following list replicates the Project Electives set forth in Appendix A</p>
A102.2 The jurisdiction shall indicate a number between and including 0 and up to and including 3 to establish the minimum total number of project electives that must be satisfied
2012 – IgCC Appendix A Section A104 – Site Project Electives
<p>A104.X (Formerly – 401.2) Predesign site inventory and assessment. An inventory and assessment of the natural resources and baseline conditions of the building site shall be submitted with the construction documents. The inventory and assessment shall: 1. Determine the location of any protection areas identified in Section 402.1 that are located on, or adjacent to, the building site; 2. Determine whether, and to the degree to which, the native soils and hydrological conditions of the building site have been disturbed and altered by previous use or development; 3. Identify invasive plant species on the site for removal; and 4. Identify native plant species on the site.</p>
<p>A104.X (Formerly – 405.1.1) Soil and water quality protection plan. A soil and water quality protection plan shall be submitted by the owner and approved prior to construction. The protection plan shall address the following: 1. A soils map, site plan, or grading plan that indicates designated soil management areas for all site soils, including, but not limited to: 1.1. Soils that will be retained in place and designated as vegetation and soil protection areas (VSPAs). 1.2. Topsoils that will be stockpiled for future reuse and the locations for the stockpiles. 1.3. Soils that will be disturbed during construction and plans to restore disturbed soils and underlying subsoils to soil reference conditions. 1.4. Soils that will be restored and re-vegetated. 1.5. Soils disturbed by previous development that will be restored in place and re-vegetated. 1.6. Locations for all laydown and storage areas, parking areas, haul roads and construction vehicle access, temporary utilities and construction trailer locations. 1.7. Treatment details for each zone of soil that will be restored, including the type, source and expected volume of materials, including compost amendments, mulch and topsoil. 1.8. A narrative of the measures to be taken to ensure that areas not to be disturbed and areas of restored soils are protected from compaction by vehicle traffic or storage, erosion, and contamination until project completion. 2. A written erosion, sedimentation and pollutant control program for construction activities associated with the project. The program shall describe the best management practices (BMPs) to be employed including how the BMPs accomplish the following objectives: 2.1. Prevent loss of soil during construction due to stormwater runoff or wind erosion, including the protection of topsoil by stockpiling for reuse. 2.2. Prevent sedimentation of stormwater conveyances or receiving waters or other public infrastructure. 2.3. Prevent polluting the air with dust and particulate matter. 2.4. Prevent runoff and infiltration of other pollutants from construction site, including, but not limited to thermal pollution, concrete wash, fuels, solvents, hazardous chemical runoff, pH and pavement sealants. Ensure proper disposal of pollutants. 2.5. Protect from construction activities the designated vegetation and soil protection areas, flood hazard areas and other areas of vegetation that will remain on site. 3. A written periodic maintenance protocol for landscaping and stormwater management systems, including, but not limited to: 3.1. A schedule for periodic watering of new plantings that reflects different water needs during the establishment phase of new plantings as well as after establishment. Where development of the building site changed the amount of water reaching the preserved natural resource areas, include appropriate measures for maintaining the natural areas. 3.2. A schedule for the use of fertilizers appropriate to the plants species, local climate and the preestablishment and post-establishment needs of the installed landscaping. Nonorganic fertilizers shall be discontinued following plant establishment. 3.3. A requirement for a visual inspection of the site after major precipitation events to evaluate systems performance and site impacts. 3.4. A schedule of maintenance activities of the stormwater management system including, but not limited to, cleaning of gutters, downspouts, inlets and outlets, removal of sediments from</p>

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<p>pretreatment sedimentation pits and wet detention ponds, vacuum sweeping followed by high-pressure hosing at porous pavement and removal of litter and debris. 3.5. A schedule of maintenance activities for landscaped areas including, but not limited to, the removal of dead or unhealthy vegetation; reseeding of turf areas; mowing of grass to a height which optimizes lawn health and retention of precipitation.</p>
<p>A104.X (Formerly – 405.1.3) Imported soils. Topsoils or soil blends imported to a building site to serve as topsoil shall not be mined from the following locations: 1. Sites that are prime farmland, unique farmland, or farmland of statewide importance. 2. Greenfield sites where development is prohibited by Section 402.8. Exception: Soils shall be permitted to be imported from the locations in Items 1 and 2 where those soils are a byproduct of a building and building site development process provided that imported soils are reused for functions comparable to their original function.</p>
<p>A104.X (Formerly – 405.1.4) Soil reuse and restoration. Soils that are being placed or replaced on a building site shall be prepared, amended and placed in a manner that establishes or restores the ability of the soil to support the vegetation that has been protected and that will be planted. Soil reuse and restoration shall be in accordance with Sections 405.1.4.1 and 405.1.4.2.</p>
<p>A104.X (Formerly – 408.2) Site hardscape. In climate zones 1 through 6, as established in the International Energy Conservation Code, not less than 50 percent of the site hardscape shall be provided with one or any combination of options described in Sections 408.2.1 through 408.2.4. For the purposes of this section, site hardscape shall not include areas of the site covered by solar photovoltaic arrays or solar thermal collectors.</p>
<p>A104.X (formerly – 408.3.2) Vegetative roofs. Vegetative roofs, where provided in accordance with Section 408.3, shall comply with the following: 1. All plantings shall be selected based on their hardiness zone classifications in accordance with USDA MP1475 and shall be capable of withstanding the climate conditions of the jurisdiction and the micro climate conditions of the building site including, but not limited to, wind, precipitation and temperature. Planting density shall provide foliage coverage, in the warm months, of not less than 80 percent within two years of the date of installation unless a different time period is established in the approved design. Plants shall be distributed to meet the coverage requirements. Invasive plant species shall not be planted. 2. The engineered soil medium shall be designed for the physical conditions and local climate to support the plants and shall consist of nonsynthetic materials. The planting design shall include measures to protect the engineered soil medium until the plants are established. Protection measures include, but are not limited to, installation of pregrown vegetated mats or modules, tackifying agents, fiber blankets and reinforcing mesh. The maximum wet weight and water holding capacity of an engineered soil medium shall be determined in accordance with ASTM E 2399. 3. Where access to the building facades is provided from locations on the perimeter of the roof, nonvegetated buffers adequate to support associated equipment and to protect the roof shall be provided. 4. Nonvegetated clearances as required for fire classification of vegetative roof systems shall be provided in accordance with the International Fire Code. 5. Plantings shall be capable of being managed to maintain the function of the vegetative roof as provided in the documents required by Section 904.3.</p>
<p>2012 – IgCC Appendix A Section A106 – Energy Conservation and Efficiency</p>
<p>A106.X (Formerly - 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.</p>

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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.

2012 – IgCC Appendix A Section A107 – Water Resource Conservation and Efficiency

A107.X (Formerly - 707.15.1)

Water quality testing. Collected rainwater shall be tested. Accumulated water to be tested shall be the result of not less than two rainfall events. Testing shall be in accordance with Sections 707.15.1.1 and 707.15.1.2.

A107.X (Formerly - 708.13.8)

Water quality test. The quality of the water for the intended application shall be verified at the point of use in accordance with the requirements of the jurisdiction.

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2012 IgCC Chapter 10 – Existing Buildings

Summary:

The language of Chapter 10 should comport with the requirements of Chapter 11. Clarify the role of the SHPO and the IgCC must conform to the Federal Law. This chapter has the possibility of increasing the reuse of existing buildings to reduce the impact development has on our community.

- * Utilize the scope requirements from the IEBC.
- * Remove cost based thresholds
- * Conform language with NHPA of 1966.
- * Follow EPA guidelines on HCFC phase out.

Chapter 2, Definitions

Substantial Improvement: Defined as any repair, reconstruction, rehabilitation, addition or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the improvement or repair is started, etc.

Recommendation: Substantial Improvement should be redefined to be in line with the International Existing Building Code (IEBC) definition of Level 3 Alterations. Otherwise tying the definition of a substantial improvement to the fluctuations of market value (not to mention tax assessed value) will not be consistent.

Justification: Redefinition will use existing code language to streamline the use and acceptance of the IgCC, not introduce potentially conflicting guidance if both IgCC and IEBC are in force.

Ashrae 189.1 Comparison: No definition provided.

Notes, References, Citations: Refer to Sec. 505 of the IEBC. Sec. 505.1 Scope for Level 3 Alterations apply where the work area exceeds 50 percent of the aggregate area of the building.

Chapter 10: Existing Building Analysis and Recommendations

1001.1 Scope and Intent: Limited to existing buildings and relocated existing buildings.

Recommendation: Keep as is good practice.

Justification: Keep broad to cover all existing structures.

Ashrae 189.1 Comparison: Sec 2. Scope, 2.1.a.3, applies to new systems and equipment in existing buildings.

Recommend adding a new clause: 2.2.a.1. Provisions do not apply to structures where new systems and equipment are not in accordance with the Secretary of the Interior Standards for Historic Preservation as determined by the SHPO.

Notes, References, Citations: Refer to the National Historic Preservation Act of 1966.

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1001.3 Scope and Intent: Exception 1: Tenants within buildings without control over tenant space systems are exempt from compliance.

Recommendation: Recommend tenant projects in existing structures built to IgCC should comply.

Justification: Most tenants have control over some systems, therefore many tenant projects can be considered to comply.

Ashrae 189.1 Comparison: No direct requirement for tenant occupancies.

Notes, References, Citations: None

1001.4 Scope and Intent: Existing materials, assemblies, configurations and systems in compliance with the code at the time of their installation, can remain unless the code official deems them to be dangerous.

Recommendation: No recommendation.

Justification: Acceptable.

Ashrae 189.1 Comparison: 2.1.a.3 Applies new systems and equipment in existing buildings.

Notes, References, Citations: In 189.1 there is no mention of required compliance beyond new work.

1003 Alterations to Existing Buildings: Where alteration cost falls below thresholds on Table 1003.2, Sec. 1003.1 requirements do not apply. The threshold is based upon the market value of property.

Recommendation: Recommend to strike the Table 1003.2. Remove the threshold requirement based on market values and replace with scope requirements listed in the IEBC (Existing Building Code). IEBC Level 1&2 Alterations would not apply. IEBC Level 3 Alterations (As defined by Sec. 505 of IEBC) would be required to comply with the requirements of this section.

Justification: Market value metric completely foreign and would disproportionately impact work in some locales, but not others, undermining the intent of the IgCC.

Ashrae 189.1 Comparison: Sec 2. Scope 2.1.a.3 Applies new systems and equipment in existing buildings.

Notes, References, Citations: Under 189.1: Existing systems undergoing maintenance may not require compliance regardless of cost. Chapter 2 defines market value for substantial improvement equal or exceeding 50% market value.

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1003 Alterations to Existing Buildings: 1003.2.1 Installation of Metering Devices required for one of eleven systems as determined by the design team.

Recommendation: Keep as-is. Many new systems enable metering.

Justification: According to engineering many new systems enable metering.

Ashrae 189.1 Comparison: 6.3.3 7.3.3 Metering devices required, above thresholds set by tables, 6.3.3B, 7.3.3B

Notes, References, Citations: None.

1003 Alterations to Existing Buildings: 1003.2.2 Economizers on all systems of 4.5 tons cooling, 54,000 btu/h, or 1800 CFM. (Exception: where space is not available to install)

Recommendation: Recommend compliance for Level 3 Alterations where space is available. Recommend use of IEBC Chapter 5 Classification of Work Level 1, 2, and 3 Alterations for compliance with Level 3 as compliance threshold. Small changes to HVAC should not trigger compliance. Strike cost as a percent of building value as a threshold. Recommend rely on IEBC classifications for compliance, using Level 3 for compliance. IEBC Level 1 and Level 2 need not comply.

Justification: Inconsistency exists between the IgCC requirements and ASHRAE without justification.

Ashrae 189.1 Comparison: 7.4.3.3 Economizers required. Threshold set at Table 7.4.3.3 (set by climate zone) Zone 4 > 33,000btu/h. Recommend retain language.

Notes, References, Citations: None.

1003 Alterations to Existing Buildings: 1003.2.2.3 Exception 2 HVAC Piping Insulation and Duct Insulation. Not required where space does not accommodate (1/2" thick min.).

Recommendation: In most cases, the 1/2" min insulation requirement can be accomplished.

Justification: Acceptable.

Ashrae 189.1 Comparison: 7.4.3.8 Requires compliance based upon climate zone data. No mention of lack of space for existing buildings. (Cites Table C-9 Typo for Climate Zone 4 Reads: R-value=.6 not 6.) Recommend to retain language.

Notes, References, Citations: Cites Sec. 606.3 and Sec. 606.4

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1003 Alterations to Existing Buildings: 1003.2.2.4 If Central Heating replaced with Electric Heat Units, all permits must add calculation resulting in less energy consumption.

Recommendation: Recommend add language that this be required for Certificate of Occupancy only.

Justification: Most likely to occur in Change of Occupancy.

Ashrae 189.1 Comparison: 7.4.3 HVAC must comply with ASHRAE 90.1 Sec. 6. with: 7.4.3.1.b. Higher Efficiency. (Cites ASHRAE 90.1) Not direct parallel language. Recommend to retain.

Notes, References, Citations: None

1003 Alterations to Existing Buildings: 1003.2.2.7 The 5 year phase out plan required for all existing building systems are required where CFC based refrigerants are used.

Recommendation: Recommend to strike. Not technically correct. HCFCs are in use. (Not CFCs. CFCs were banned as of 2001). Plus, the EPA sets guidelines for phase-out. Poorly written. Potential for scope creep, increasing cost for smaller projects. Requiring accelerated phase out will incur extra costs on existing buildings, acting as a disincentive.

Justification: EPA sets guidelines for phase-out of CFCs, HCFCs and all other refrigerants on a timetable that is accepted nationally.

Ashrae 189.1 Comparison: 9.3.3 Refrigerants in HVAC and, in fire suppression systems containing HCFCs (and/or CFCs) are not permitted. No direct language requiring a 5 year phase out for an existing building. Recommend to retain language.

Notes, References, Citations: Refer to the EPA phase out schedule.

<http://www.epa.gov/Ozone/title6/phaseout/hcfc.html>

1003 Alterations to Existing Buildings: 1003.2.2.8 If mechanical and electrical associated equipment are connected via processors with the ability to communicate to a computer, then a Building Automation System (BAS) is required.

Recommendation: Recommend for use in buildings with BAS present. Or, for all Level 3-equivalent work. For larger projects, this might be anticipated, but smaller projects, new equipment often includes processors that might add cost for smaller footprint buildings.

Justification: Smaller renovation work should not fall under this requirement.

Ashrae 189.1 Comparison: No direct requirement for retrofitting BAS in existing building.

Notes, References, Citations: Refer to the scope requirements under the IEBC.

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1003 Alterations to Existing Buildings: 1003.2.3.1 Water storage tanks must have R-16 total combined.

Recommendation: Recommend to retain. Though, could require additional insulation.

Justification: Most commercial HWHs may be able to comply.

Ashrae 189.1 Comparison: No direct requirement for hot water heaters.

Notes, References, Citations: The code does not mention the benefits of conditioned space installations.

1003 Alterations to Existing Buildings: 1003.2.3.2 Service Water Systems-accessible hot/cold supply and distribution piping required to comply with Sec. 607.6.

Recommendation: Keep as written.

Justification: Consider this as good practice for the accessible piping, only.

Ashrae 189.1 Comparison: N/A

Notes, References, Citations: Cites Sec. 607.6

1003 Alterations to Existing Buildings: 1003.2.3.3 Service Water Systems-circulating pump controlled as required by Sec. 607.7

Recommendation: Refer to Chapter 6 recommendation.

Justification:

Ashrae 189.1 Comparison: N/A

Notes, References, Citations: Cites Sec. 607.7

1003 Alterations to Existing Buildings: 1003.2.6 Insulating buildings less than three (3) stories must occur in accessible attics where greater than 24" clear.

Recommendation: Recommend to retain. Add exception for analysis showing detriment to historic structures listed by the SHPO.

Justification: Adding exception will lessen impact on historic structure building fabric.

Ashrae 189.1 Comparison: 7.4.2.3 Single rafter roof insulation. Climate zone 4 requires R38+R10ci. (Cites table A-9). Would be difficult for existing buildings unless Level 3 Alteration Criteria used.

Notes, References, Citations: Refer to the National Historic Preservation Act of 1966.

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1004 Change of Occupancy:

Recommendation: No changes to this provision.

Justification:

Ashrae 189.1 Comparison:

Notes, References, Citations:

1005 Historic Buildings: 1005.1.1 Implementation of requirements results in visual change, 'not in keeping with historic character' as determined by the Code Official.

Recommendation: Recommend to re-write to include SHPO and/or local HPC as AHJ required to be contacted by Code Official prior to approval. Coordinate the language of this section with the federal National Historic Preservation Act (NHPA).

Justification: Unless this provision is not first approved by the SHPO and/or the local HPC, this requirement will have a negative impact on listed and eligible historic buildings.

Ashrae 189.1 Comparison: No mention of required compliance beyond new work.

Notes, References, Citations: None

1006 Demolition: 1006.1 Construction material and waste management plan required by Sec. 503.1.

Recommendation: Acceptable as written.

Justification:

Ashrae 189.1 Comparison: No mention of required compliance beyond new work.

Notes, References, Citations: Cites Sec. 503.1

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1007 Jurisdictional Requirements: 1007.2.2 Specific Exclusions: Where evidence that compliance is not available, these sections are not required for compliance: 401.2, 406.1, 406.2, 502, 503.1 and 803.1 portions of Sec. 405.

Recommendation: Recommend moving 1007 to Appendix as elective.

Justification: In many cases these sections are not relevant to existing buildings (although the sections are relevant to new construction).

Ashrae 189.1 Comparison: No specific exclusions from compliance.

Notes, References, Citations: Cites Sec. 401.2 (native soil/plant survey), 406.1 (site waste management), 406.2 (hardscape waste management), 502 (material management), 503.1 (construction waste), 803.1 (ventilation requirements).

1007 Jurisdictional Requirements: 1007.3 Co2 Emissions. And post occupancy certificate of zEPI calculation.

Recommendation: Not-recommended to adopt at this time. Accuracy of this calculation is only as good as the basis of existing materials and systems known. Hidden conditions or additional analysis would be required for thorough zEPI.

Justification: The zEPI calculation will incur additional costs on design and construction. Plus, baseline building type is fictional and difficult to compare with software still in its infancy.

Ashrae 189.1 Comparison: No specific exclusions from compliance.

Notes, References, Citations: Cites Sec. 602.2.

1007 Jurisdictional Requirements: 1007.3.2 Post Certificate - Intent, total net energy use, peak demand and emissions.

Recommendation: Not-recommended to adopt at this time. The Intent includes, energy, emissions and CO2 for all existing buildings undergoing renovations based upon the percentage of cost to the buildings value.

Justification: Smaller projects could face additional overhead design fees in order to comply.

Ashrae 189.1 Comparison: 7.5.2 Annual energy cost that is less than or equal to limits set in Appendix D. (Not recommended due to energy price fluctuations.)

Notes, References, Citations: Cites Sec. 601 and Sec. 602

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1007 Jurisdictional Requirements: 1007.3.3.1 zEPI Reporting.

Recommendation: Premature to recommend at this time.

Justification: The zEPI calculation will incur additional costs on design and construction. Plus, baseline building type is fictional and difficult to compare with software still in its infancy.

Ashrae 189.1 Comparison: No direct equivalent.

Notes, References, Citations: None

1007 Jurisdictional Requirements: 1007.3.3.2 Peak Monthly energy demand reporting, for all forms of energy. (Gas, Electric, Oil, Water).

Recommendation: With the introduction of more integrated metering in new systems, this requirement is recommended and is readily achievable.

Justification: The zEPI calculation will incur additional costs on design and construction. Plus, baseline building type is fictional and difficult to compare with software still in its infancy.

Ashrae 189.1 Comparison: 7.5.2 Annual energy cost that is less than or equal to limits set in Appendix D. (Not recommended due to energy price fluctuations.)

Notes, References, Citations: None

1007 Jurisdictional Requirements: 1007.3.3.3 CO2 Emission reporting. Per Annum.

Recommendation: Not-recommended to adopt at this time. Suggest threshold for larger, mixed use projects.

Justification: Challenging to implement, early software can identify benefits of existing building reuse with this type of analysis.

Ashrae 189.1 Comparison: 7.5.3 Annual Co2 Equivalent. No zEPI. Instead, load factors based upon fuel type. Challenging to calculate, especially if the power is from mixed sources (as is often the case).

Notes, References, Citations: NTHP Green Lab - Life Cycle Assessment Report.

http://www.preservationnation.org/information-center/sustainable-communities/green-lab/lca/The_Greenest_Building_lowres.pdf

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1007 Jurisdictional Requirements: See 1007.3.2 Intent: Provide for the ongoing reporting and display of the total annual net energy use, peak energy demand and emissions associated with operation of the building and its systems to document ongoing compliance with the provisions of Sections 601 and 602.

Recommendation: Recommend adding exclusion for Sec. 605, Building Envelope Systems, compliance for eligible and listed historic buildings.

Justification: Severe impact on design and building integrity, especially for eligible for listing on National Register and local Historic Preservation Master Plan.

Ashrae 189.1 Comparison: Sec 7.4.2.5 Permanent projections for buildings in Climate Zones 1-5. Locate on East, South and West facades. Recommend to strike this section unless there is an exception written for historic structures as identified by the SHPO or local HPC.

Notes, References, Citations: None

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2012 IgCC Chapter 11 – Existing Building Site Development

Summary:

Language should be consistent between Chapter 10 and 11. These both Impact existing buildings, historic buildings listed or eligible for listing on the National Register, as well buildings on the Montgomery County Master Plan for Historic Preservation and the Locational Atlas and Index of Historic Sites.

- * Utilize recent Montgomery County Zoning changes in lieu of IgCC on existing sites.
- * Increase appendix elective points for building reuse.
- * Utilize Montgomery County Historic Preservation Commission criteria.

Chapter/Section Analysis with Recommendations

1101 General: 1101.2 Operations and Maintenance. Conform to the code in place when the improvements were installed.

Recommendation: No issue with this language.

Justification: Presents minimal impact on reusing existing building sites.

Ashrae 189.1 Comparison: No equivalent language.

Notes, References, Citations: None

1103 Alterations to Existing Building Sites: 1103 Changes to Hardscape. 1103.2.2 Existing Parking Lots are Altered, but not increased in capacity. Sec. 407.4 is not required.

Recommendation: Add exception for historic sites.

Justification: Cross-reference with requirements under the NHPA of 1966.

Ashrae 189.1 Comparison: Sec. 5.4.1.1.a-d Effective Pervious Area for All Sites. 40% of the entire site: a. vegetative growing medium, b. vegetative roof with 3" growing medium, c. porous pavers, d. permeable pavement.

Requirements may not be compatible with listed or eligible sites/buildings. Recommend Exception 5. Historic sites where compliance would disturb existing contributing features as defined by the SHPO.

Notes, References, Citations: Cites Sec. 402.1

1104 Change of Occupancy: 1104.2.2 Where parking for vehicles is already present, long term bike parking is required comply with Sec. 407.3

Recommendation: Recommend striking due to conflict with Montgomery County Zoning.

Justification: Review under Montgomery County Zoning in lieu of IgCC.

Ashrae 189.1 Comparison: No equivalent language.

Notes, References, Citations: Cites Sec. 407.3

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1105 Historic Building Sites: 1105.1.1 Recommends Code Official consult with AHJ over Historic Buildings and Sites prior to requiring compliance/exemption with this code.

Recommendation: Add direct reference to SHPO and/or local HPC.

Justification: Without the inclusion of the SHPO and/or local HPC, this requirement will have a negative impact on listed and eligible historic buildings and their associated sites.

Ashrae 189.1 Comparison: Sec 5.5.1.a Performance Method: If the project is existing building envelope, then 20% of the average rainfall on the existing building footprint must be managed through infiltration, reuse or evapo-transpiration. IgCC may exempt historic sites from requirements, 189.1 does not. Recommend 189.1 to exempt historic sites as designated by SHPO and/or local HPC.

Notes, References, Citations: None.

Appendix Elective: A105.6 Existing Building Reuse. Existing Building on Site: Reuse 75% of the existing core and shell.

Recommendation: Recommend increasing the potential of existing building reuse from 1 point to 5 points.

Justification: Increasing elective incentives for existing buildings reduces infrastructure and resource demands.

Ashrae 189.1 Comparison: No credit for retaining or reusing existing buildings. Despite LCA studies that show existing building reuse can outperform new, high performance design.

Notes, References, Citations: [http://www.preservationnation.org/information-center/sustainable-communities/green-lab/lca/The Greenest Building lowres.pdf](http://www.preservationnation.org/information-center/sustainable-communities/green-lab/lca/The_Greenest_Building_lowres.pdf)

Appendix Elective: A105.7 Historic Building Reuse. Existing building designated as either a local or national historic structure or eligible historic structure be reused with retaining 75% of the existing core and shell.

Recommendation: Recommend increasing the potential of existing building reuse from 1 point to 5 points.

Justification: Increasing elective incentives for existing buildings reduces infrastructure and resource demands.

Ashrae 189.1 Comparison: No credit for retaining or reusing existing buildings. Despite Life Cycle Analysis (LCA) studies that show existing building reuse can outperform new, high performance design.

Notes, References, Citations: [http://www.preservationnation.org/information-center/sustainable-communities/green-lab/lca/The Greenest Building lowres.pdf](http://www.preservationnation.org/information-center/sustainable-communities/green-lab/lca/The_Greenest_Building_lowres.pdf)

Nauman, Mark

From: Eileen Emmet [eemmet.aia@gmail.com]
Sent: Wednesday, July 31, 2013 9:33 PM
To: Jones, Diane
Cc: Mansouri, Hadi; Nauman, Mark; Mustafa, Hemal; Scott Knudson; William Le Roy
Subject: AIA-Potomac Valley - International Green Construction Code Task Force Work
Attachments: 2013-0730 AIA-PV IgCC Ltr to DPS.pdf; 2013-0730 Attach A-AIA-PV IgCC ExecSumm.pdf; 2013-0730 Attach B-AIA-PV IgCC ChapSummaries.pdf

The local American Institute of Architects, Potomac Valley Chapter is pleased to respond to your request for our input regarding adoption of the 2012 International Green Construction Code (IgCC). Please refer to the attached cover letter, Executive Summary (Attachment A) and Detailed Summaries of each IgCC Code Chapter (Attachment B).

Sincerely,

Eileen Emmet, AIA-PV IgCC Task Force Co-Chair
eemmet.aia@gmail.com
(301) 275-2580 cell

8/4/2013

Nauman, Mark

From: Eileen Emmet [eemmet.aia@gmail.com]
Sent: Thursday, August 01, 2013 8:16 AM
To: Nauman, Mark
Cc: Scott Knudson; Bill LeRoy; Ralph Bennett
Subject: AIA-PV IgCC Transmittal followup

Good morning Mark,

I emailed the results of our IgCC task force last night. Although we understand they will be of most help to you and others in your office, our group felt it was important to address the transmittal to Diane Jones.

Once you have a chance to digest our recommendations, our group would be happy to meet and go over them with you. We imagine this is something that might occur before DPS rolls out the public comment document.

In addition, we want to hold two AIA-PV programs to bring the IgCC issues to a wider group of people. The first program is planned at the Silver Spring Civic Center on Monday, August 19, 6:30-8:30 pm. We have invited Justin Wiley of the ICC to say a few words at the beginning of the presentation, then our task force members will present an overview of their recommendations. The intent of this first program is to get feedback on the recommendations we submitted to DPS, to see if we missed anything or need to adjust our recommendations. The second hour of the 2-hr program is for Q&A and dialog. We'd be pleased if you could attend and say few words at the beginning about the DPS goals and also be available to answer questions. Please let me know if you are interested.

We envision the second program will be in Rockville after you roll out the public comment document, with you presenting your recommendations. We'd like to work with you to outline the timing and details of that program with as much as 6 weeks advance planning if possible.

Please let me know if there's anything else you need.

Regards,

Eileen Emmet
AIA-PV IgCC Task Force Co-chair
(301) 275-2580

8/4/2013