Public Testimony on WSEC Errors and Omissions
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The WSEC legislative draft is the result of a major effort to merge existing WSEC 2015 amendments into the reorganized 2018 IECC, and then to consider numerous code change proposals which sometime overlapped. Organizationally and clarity wise the resulting document is a great improvement on the WSEC 2015. As with any code and especially a change of this magnitude there are numerous instances of wrong or confusing language.

I read the code cover to cover and attempted to catalog issues where the language, in my opinion, has issues. Comments from a few other sources have also been included. The result is the long listing of issues in the following table. Where possible, language changes are suggested and marked in underscore/strikethrough format with the Legislation Draft as the base.

The table has five columns denoting:

Section or Table –the location of the primary code section
Issue and Suggested Edit–description of the issue and any suggested language changes
Action – Attempt to classify the next step. Actions include:
- **Edit** – items that council staff can likely edit without TAG input
- **Edit / TAG** – items where council staff may need TAG input
- **TAG or MVE** – items that would seem to require TAG review

Priority – Assigned priority from 1 (important) to 3 (not important).
Type – Attempt to classify the issue
- **Clarity** – Item to improve code clarity.
- **Conflict** – the code item conflicts with itself or other areas of the code
- **Oversight** – Other issues that are not correct.

Many items are low priority and can and will be ignored but many of the items are important and should be addressed before the code is finalized. Generally priority 1 and 2 are pretty important. Priority 3 where they are easy fixes are also worth doing.

The goal of the recommended language is to makes the intent clearer and not to change the intended stringency. The table is currently sorted by the Section or Table column.

Section or Table	Issue and Suggested Edit (if any)	Action	Priority	Type
C202 Computer room and data center definitions	The Computer room definition includes spaces with <=20W/ft2 and total load <=10kW while the data center definition cover spaces with >20 watts/ft2 and total load > 10kW. Applicable rooms fall between these two definitions. Spaces with 25 W/ft2 of load but with total load less than 10 kW and those with 19 W/ft2 of load but with total load of 20kW will not be computer rooms or data centers and not be covered by the exceptions related to computer rooms or the added requirements of data centers. There is also a typo: "IET" should be "ITE" per the definition of Information technology equipment. Suggested change: COMPUTER ROOM. A room whose primary function is to house equipment for the processing and storage of electronic data and that has a design total information technology equipment (~~IET~~ITE) equipment power less than or equal to 20 watts per square foot of conditioned area ~~and~~or a design ~~IET~~ITE equipment load less than or equal to 10 kW.	Edit / TAG	1	Over sight
C202 Retrofit, Building envelope	The word retrofit only occurs in the code text as it relates to C501 u-factor requirements and then in a way that does not link to this definition. The word "alteration" is used by the code in all other places to describe retrofit work. Delete this definition and in C501.4.1 replace "retrofit" with "alteration". Suggested language: ~~**RETROFIT, BUILDING ENVELOPE.** Includes building envelope alterations and building envelope upgrades required for an area undergoing a change in space conditioning or a change in occupancy.~~ **C501.4 Compliance.** *Alterations*, *repairs*, *additions* and changes of occupancy to, or relocation of, existing buildings and structures shall comply with the provisions for *alterations*, *repairs*, *additions* and changes of occupancy or relocation, respectively, in this code and in the *International Building Code*, *International Existing Building Code, International Fire Code*, *International Fuel Gas Code*, *International Mechanical Code*, *Uniform Plumbing Code*, and NFPA 70. **C501.4.1 U-factor requirements for ~~retrofits~~ additions and alterations.** For existing building projects where an *addition* or *building envelope* ~~*retrofit*~~ *alteration* area is combined with existing-to-remain building areas to demonstrate compliance with this Code as a whole building, the U-factors applied to existing-to-remain envelope assemblies shall be in accordance with record documents. **Exceptions~~s~~**: 1. If accurate record documents are not available, U-factors for the existing envelope assemblies may be in accordance with the edition of the Washington State Energy Code that was in effect at the time the building was permitted, or ~~2. U-factors for the existing envelope assemblies~~ as approved by the *code official.*	TAG	3	Clarity

Section or Table	Issue and Suggested Edit (if any)	Action	Priority	Type
C202 Space conditioning Category definition	Phrase "from lowest to highest" should be deleted as it adds nothing and doesn't make sense when it comes to comparing conditioned space with coolers and freezers. Suggested Language: SPACE CONDITIONING CATEGORY. Categories are based on the allowed peak space conditioning output capacity per square foot of conditioned floor area, or the design set point temperature, for a building or space. Space conditioning categories ~~from lowest to highest~~ include: Low energy, semi-heated, conditioned, refrigerated walk-in and warehouse coolers, and refrigerated walk-in and warehouse freezers.	Edit / TAG	3	Clarity
C202 Vertical fenestration definition	The vertical fenestration definition mentions glazed doors but does not define the term. Suggested change: **VERTICAL FENESTRATION.** Windows that are fixed or operable, ~~glazed~~ doors with more than 50% glazed area~~,~~ and glazed block ~~and combination opaque/glazed doors~~ composed of glass or other transparent or translucent glazing materials and installed at a slope not less than 60 degrees (91.05 rad) from horizontal. Opaque areas such as spandrel panels are not considered vertical fenestration.	TAG	2	Clarity
C402.1.1.2 Semi-heated buildings and spaces	The added sentence is misleading as no cooling equipment is allowed and complying with a definition is atypical. Suggested text: The total installed output capacity of ~~mechanical~~ space ~~conditioning~~heating systems serving a *semi-heated* building or *space* shall be no greater than 8 Btu/(h-ft^2) and mechanical cooling is not allowed in accordance~~comply~~ with Section C202.	TAG	3	Clarity
C402.1.1.2 Semi-heated buildings and spaces, exceptions	New exceptions accidentally allow "semi-heated" space to have unlimited capacity of cooling disabled heat pumps and electric resistance infrared heat for "localized heating applications". The localized application term is undefined. Zonal infrared heaters are localized in their impact so could be installed throughout the warehouse. This is a significant rollback in code for buildings willing to install electric resistance infrared heating. This exception was created to allow banned heat sources (e.g. electric resistance). The heat capacity limit and control provisions need to still be enforced. Heat pumps are not a form of electric resistance heat, so do not need to be listed but this has been left in the text below. **Suggested Language:** EXCEPTION~~s~~: A semi-heated building~~Building~~ or space may comply with this section~~as semi-heated~~ when served by one or more of the following mechanical system alternatives provided the total installed heating output capacity does not exceed that which is allowed for semi-heated: 1. Electric infrared heating equipment for localized heating applications. 2. Heat pumps with cooling capacity permanently disabled, as preapproved by the jurisdiction.	TAG	2	Over sight

<table>
<tr><th>Section or Table</th><th>Issue and Suggested Edit (if any)</th><th>Action</th><th>Priority</th><th>Type</th></tr>
<tr><td>C402.1.1.3 Greenhouses</td><td>Legislative draft states nonopaque envelope must comply with Table C402.1.3 (opaque table) rather than Table C402.1.1.3 Non-Opaque Thermal Envelope Maximum Requirements, which was submitted with the accepted proposal Env013-2018. The proposed table is also missing from the legislative draft.

C402.1.1.3 Greenhouses. Greenhouse structures or areas that comply with all of the following shall be exempt from the building envelope requirements of this code:
1. Exterior opaque envelope assemblies comply with Sections C402.2 and C402.4.4.
EXCEPTION: Low energy greenhouses that comply with Section C402.1.1.1.
2. Interior partition building thermal envelope assemblies that separate the greenhouse from conditioned space complying with Sections C402.2, C402.4.3 and C402.4.4.
3. Nonopaque envelope assemblies complying with the thermal envelope requirements in Table C402.1.1.3. The U-factor for the nonopaque roof shall be for the roof assembly or a roof that includes the assembly and an internal curtain system.
EXCEPTION: Unheated greenhouses.
4. No mechanical cooling is provided.
5. For heated greenhouses, heating is provided by a radiant heating system, a condensing natural gas-fired or condensing propane-fired heating system, or a heat pump with cooling capacity permanently disabled as preapproved by the jurisdiction.

Table C402.1.1.3 - Non-Opaque Thermal Envelope Maximum Requirements
<table><tr><th>Component U-factor (BTU/h-ft2-°F)</th><th>Climate Zone 5 and Marine 4</th></tr><tr><td>Non-Opaque Roof</td><td>0.5</td></tr><tr><td>Non-Opaque SEW Wall</td><td>0.7</td></tr><tr><td>Non-Opaque N Wall</td><td>0.6</td></tr></table></td><td>Edit</td><td>1</td><td>Oversight</td></tr>
<tr><td>C402.1.3 Insulation component R-value-based method</td><td>Text stating doors include those with <50% glazing has been deleted. Now the only place mentioning the 50% division is the C202 definition for Opaque door and section C402.4.4 which is pretty buried. Action: Be sure occurrences of Opaque Door are italicized throughout the code.</td><td>Edit</td><td>3</td><td>Clarity</td></tr>
</table>

Section or Table	Issue and Suggested Edit (if any)	Action	Priority	Type
C402.1.4 (Table)	Garage door is not defined. The definition for non-swinging door includes all doors "that are not swinging doors". There needs to be a definition for when this is applied and the non-swinging door definition adjusted, or all garage door entries should be deleted. The change to the nonswinging door definition is important. The new garage door definition below is optional. It is not from other codes or from the ASMA standard which leaves the term undefined. So there is a chance this is very wrong. Suggested definitions: DOOR, GARAGE DOOR. Doors rated by standard ASMA 105 with a single panel or sectional panels. **DOOR, NONSWINGING.** Roll-up, tilt-up, metal coiling and sliding doors, access hatches, and all other doors that are not swinging *doors* or *garage doors* with ≤14% glazing.	TAG	2	Conflict
C402.2.4 Below grade walls	C-Factor should be changed to U-factor in the added sentence as the WSEC does not utilize C-factors. Appendix A only supplies U-values. Suggested text for edit: **C402.2.4 Below-grade walls.** The *R*-value of the insulating material installed in, or continuously on, the below-grade walls shall be in accordance with Table C402.1.3. The ~~*C*~~*U*-factor or *R*-value required shall extend to the level of the lowest floor of the conditioned space enclosed by the below-grade wall.	Edit	3	Over sight
C402.4.1.1.1 Optimized daylighting.	ENV39 and ENV40 were both passed by the TAG but the merged legislative draft does not include a change made in ENV39 that results in higher VT in north oriented fenestration and all orientations in buildings with projection factors (PF) over 0.2. One concern though is there are separate SHGC requirements for 6 different conditions and there is no provision for area weighting. With this change buildings with PF over 0.5 will have to have a VT ≥ 0.67. 2. Visible transmittance (VT) of all *vertical fenestration* in the building is greater than or equal to 1.1 times the required solar heat gain coefficient (SHGC) per Section C402.4, or 0.50, whichever is greater. It shall be permitted to demonstrate compliance based on an area weighted average *VT* being greater than or equal to the area weighted average of the minimum VT requirements.	Edit / Tag	3	Over sight
C402.5.7 Vestibules	*Building entrance* should be italicized to reference definition	Edit	3	Typo

Section or Table	Issue and Suggested Edit (if any)	Action	Priority	Type
C403.1.1 HVAC total system performance ratio	Currently TSPR looks like a procedure one is going to look up appendix D and follow but reading Appendix D is quickly confusing. It would be good to state that TSPR can be calculated using software that complies with Appendix D rather than make it sound like someone is going to look up appendix D and follow the directions. Suggested language: **C403.1.1 HVAC total system performance ratio (HVAC TSPR).** For systems serving office, retail, library, and education occupancies subject to the requirements of Section C403.3.5 without exceptions, the *HVAC total system performance ratio* (*HVAC TSPR*) of the *proposed design* HVAC system shall be more than or equal to the *HVAC TSPR* of the *standard reference design* as calculated according to Appendix D, Calculation of HVAC Total System Performance Ratio, or *approved* calculation software.	TAG	3	Clarity
C403.1.1 HVAC total system performance ratio (HVAC TSPR)	C403.1.1 states the applicability as a function of another section buried in the code and the terminology of the two sections is different, this one referring to "office, retail, library, and education occupancies" and C403.3.5 referring to occupancy groups A1, A2 and so on. This is very confusing and likely stems from the TSPR being formulated with the WSEC 2015 while another proposal was changing the section it was referencing. As currently written this provision would only be required where these two lists overlap and in general DOAS is required all areas mentioned in the TSPR section. This section should be standalone in terms of specifying where it is applicable. If it is limited to office, retail, library, and education occupancies then the reference to Section 403.3.5 should be struck and not replaced. If the intent is that education occupancy is to include the whole school and not just the classroom wings then C403.1.1 should probably be referencing buildings rather than occupancies.	TAG	2	Clarity
C403.10.1.1 Ducts conveying outdoor air	I'm confused as to what requirements are being required for ducts, shafts and plenum. The text of this section makes clear distinction between ducts and shafts and plenums but the lead sentences and/or section titles of C403.10, C403.10.1, C403.10.1.1, and C403.10.2 are inconsistent. The way the code is written all ducts that extend from the wall to the damper have to comply with the section C403.10.1.1 as required and with the table. The first note says to see C403.10.1.1 (the very section this table is in) for more details. This reiteration of the section is very confusing. The second Notes entry says to see exception 1 for further details, but exception 1 requires compliance with the table. This section needs an edit. I have a revised version started that can be provided if this item is acted upon.	TAG	2	Clarity

Section or Table	Issue and Suggested Edit (if any)	Action	Priority	Type
C403.10.1.2	Confusing since C403.10.1.2 largely repeats in text the contents of Table C403.10.1.2 but table notes column indicates "See Section C403.10.1.2 for details. The only detail beyond the repeated material is that ducts need to be sealed which overlaps C403.10.1.3 to some degree. The text and exceptions of section C403.10.1.2 should be deleted and replaced with "All other supply and return air ducts and plenums shall be insulated in accordance with Table C403.10.1.2. All ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with Section 603.9 of the International Mechanical Code. That way the other requirements are not buried in the text that is no longer needed	TAG	3	Clarity
C403.10.1.2 (Table)	Last entry should lead off with "Within"	Edit	3	Typo
C403.2 Design	This charging language is crazy making. First it says that buildings must comply with the two subsections of this section. Then it says buildings with applicable systems need to comply with the other sections C403.3 though C403.11. Buildings need to comply with C403 and that means all the subsections. If every section had to lead off with a list of the subsections that need to be complied with the code needs major edit. And C403.2 should not be saying that buildings also need to comply with other sections at the same level. All charging language in C403.2 should be deleted and the subsections presented directly. Suggested language: **C403.2 System design.** ~~Mechanical systems shall be designed to comply with Sections C403.2.1 andC403.2.2. Where elements of a building's mechanical systems are addressed in Sections C403.3 through C403.11, such elements shall comply with the applicable provisions of those sections.~~	TAG	3	Clarity
C403.3.2 (table)	ASHRAE 90.1-2019 will be incorporating many improved equipment efficiency values and in the case of computer room equipment a completely reworked table with more useable structure. The values in the last public release could be added now and any required changes made in October when 90.1-2019 is published. Addenda of interest with highlighted ones being of primary interest: be - large increase in CRAC efficiency and reworked table bd - adds table for heat pump / heat reclaim chillers bq - slight upgrades to heat rejection and critical addition of dry coolers br - refrigeration equipment - (improved to 3/2017 standard) cn : refrigeration equipment per standards taking effect 2017 and 2020 bs - domestic hot water efficiency – significantly different format, easier to enforce, uses current UEF metric rather than old EF bn - PTAC/HP SPVAC/HP - handles low and high cap cases explicitly and improved efficiency for SPVAC/HP equipment bo - furnaces - slight efficiency improvement - mostly adds 1/2023 standard change but some other stuff bp – boilers- new footnotes eliminate constant burning pilot lights in equipment < 300000Btuh. And requires small hot water boilers to have temperature reset bm- updates unitary heat pump efficiencies slightly to 1/2023 standard	MVE	2	Opportunity

Section or Table	Issue and Suggested Edit (if any)	Action	Priority	Type
C403.3.2.2 Water-cooled centrifugal chilling package.	90.1-2016 adds criteria to the non-standard chiller equation that didn't make into the IECC or WSEC. Change: 1. ~~Minimum evaporator leaving temperature: 36°F~~. 1. Evaporator leaving temperature is not less than 36°F and not greater than 60°F.	TAG	3	Over sight
C403.4.4 Part load controls	Table C403.4.4 specifies a 10hp threshold for VFD on chilled water and heat rejection pumps is in conflict with section C403.2.3 which requires VFD on all pumps >= 7.5hp Suggested Action: change 10hp to 7.5hp	TAG	2	Conflict
C403.4.5 Pump isolation.	The exception to this section is an IECC error. We don't want chillers piped in series to be exempt, we want them to be treated as a single chiller but the group still needs to be isolated from other chillers. Following the 90.1 approach, suggested language: **C403.4.5 Pump isolation.** Chilled water plants including more than one chiller shall be capable of and configured to reduce flow automatically through the chiller plant when a chiller is shut down and automatically shut off flow to chillers that are shut down. Chillers piped in series for the purpose of increased temperature differential shall be considered as one chiller. ~~EXCEPTION: Chillers that are piped in series for the purpose of increased temperature differential.~~ Boiler systems including more than one boiler shall be capable of and configured to reduce flow automatically through the boiler system when a boiler is shut down.	TAG	2	Over sight
C403.7.6(2) (table)	Table inconsistently applies 2018 IECC/90.1-2016 flow rates for systems in zone 5B. For OA fractions be 0% and 50% the cfm thresholds are the same as 90.1, for OA fractions between 50% and 80% OA the cfm thresholds are zero, and for over 80% OA the cfm is the same as 90.1 again (80cfm). Suggested change: Follow 2018 IECC table C403.7.4(2) and replace zeros in climate 5b 50%-80% columns with 140, 120, and 100 respectively.	Edit	2	Over sight
C403.8 Fan and fan controls	The charging language is misleading. All fans, not just HVAC fans, must comply with each sub-section as required by that sub-section. All fan motors > 1hp must comply with C403.8.2, only HVAC supply fan motors need to comply with C403.8.5.1. All fan motors over 5hp must comply with C403.8.3. Suggested language: C403.8 Fan and fan controls. This section regulates fans and fan motors and control.~~Fans in HVAC systems shall comply with Sections C403.8.1 through C403.8.5.1. The airflow requirements of Section C403.8.5.1 shall apply to all fan motors. Group R occupancy exhaust fans shall also comply with Section C403.8.4.~~	Edit / TAG	1	Clarity

Section or Table	Issue and Suggested Edit (if any)	Action	Priority	Type
C403.8.1 Allowable fan motor horsepower	Added DOAS sentence create possible confusion. It reads like it's targeted at the treatment of the terminal units and that makes it confusing since terminal units that are not installed in conjunction with DOAS also are evaluated as separate HVAC systems. Sentence needs to be written to clearly address the treatment of DOAS. Suggested Language: **C403.8.1 Allowable fan motor horsepower.** Each HVAC system having a total fan system motor nameplate horsepower exceeding 5 hp (3.7 kW) at fan system design conditions shall not exceed the allowable *fan system motor nameplate hp* (Option 1) or *fan system bhp* (Option 2) as shown in Table C403.8.1(1). This includes supply fans, exhaust fans, return/relief fans, and fan-powered VAV air terminal units associated with systems providing heating or cooling capability. Single *zone* variable air-volume systems shall comply with the constant volume fan power limitation. DOAS fan systems complying with C403.3.5 shall be evaluated as a separate HVAC system from the heating and cooling systems and terminal units serving the same zone. ~~Zone heating and/or cooling terminal units installed in conjunction with a dedicated outdoor air system (DOAS) shall be evaluated as separate HVAC systems for allowable fan motor horsepower.~~	TAG	3	Clarity
C403.8.3 Fan efficiency	IECC issue. Exception 1 is ambiguous and has at least one interpretation that would be completely counter to intent. The lead of “Fans of 5hp or less” defeats the purpose of 1.2 which is to regulate fan walls with a total of 5hp or more where individual fans might be less than 5 hp. Suggested language (from 90.1-2016): **C403.8.3 Fan efficiency.** Fans shall have a fan efficiency grade (FEG) of 67 or higher based on manufacturers' certified data, as defined by AMCA 205. The total efficiency of the fan at the design point of operation shall be within 15 percentage points of the maximum total efficiency of the fan. EXCEPTION: The following fans are not required to have a fan efficiency grade: ~~1. Fans of 5 hp (3.7 kW) or less as follows:~~ 1.~~1~~. Individual fans with a motor nameplate horsepower of 5 hp (3.7 kW) or less~~, unless Exception 1.2. applies~~that are not part of a group operated as the functional equivalent of a single fan. ~~1.~~2. Multiple fans in series or parallel that have a combined motor nameplate horsepower of 5 hp (3.7 kW) or less and are operated as the functional equivalent of a single fan. ~~2~~3. Fans that are part of equipment covered under Section C403.3.2. ~~3~~4. Fans included in an equipment package certified by an approved agency for air or energy performance. ~~4~~5. Powered wall/roof ventilators. ~~5~~6. Fans outside the scope of AMCA 205. ~~6~~7. Fans that are intended to operate only during emergency conditions.	TAG	2	Over sight

Section or Table	Issue and Suggested Edit (if any)	Action	Priority	Type
C403.8.3 Fan efficiency	The industry, ASHRAE 90.1-2019 and 2021 IECC have switched over to FEI instead of FEG. The fan efficiency section should be updated in coordination with the IECC change (CE139) which passed the first round of IECC voting 14-1. This could be adopted in total which would extend requirements from what is currently in the legislative draft to small (1-5 hp) non-embedded motors, or the main section could be changed with no changes to the exceptions which would preserve the current stringency but adopt the new fan efficiency index metric. **New definitions:** **FAN, EMBEDDED.** A fan that is part of a manufactured assembly where the assembly includes functions other than air movement. **FAN ARRAY.** Multiple fans in parallel between two plenum sections in an air distribution system. **FAN NAMEPLATE ELECTRICAL INPUT POWER.** The nominal electrical input power rating stamped on a fan assembly nameplate. **FAN ENERGY INDEX (FEI).** The ratio of the electric input power of a reference fan to the electric input power of the actual fan as calculated in accordance with AMCA 208. **FAN SYSTEM ELECTRICAL INPUT POWER.** The sum of the fan electrical power of all fans that are required to operate at fan system design conditions to supply air from the heating or cooling source to the conditioned spaces and/or return it to the source or exhaust it to the outdoors. **Revise as follows:** **C403.8.3 Fan efficiency (Mandatory).** Each fan and fan array ~~Fans~~ shall have a fan energy index ~~efficiency grade~~ (FEI ~~FEG~~) of not less than ~~67~~1.00 at the design point of operation, as determined in accordance with AMCA 208205 by an approved, independent testing laboratory and labeled by the manufacturer. Each fan and fan array used for a variable-air-volume system shall have an FEI of not less than 0.95~~The total efficiency of the fan~~ at the design point of operation ~~shall be within 15 percentage points of the maximum total efficiency of the fan~~as determined in accordance with AMCA 208 by an approved, independent testing laboratory and labeled by the manufacturer. The FEI for fan arrays shall be calculated in accordance with AMCA 208 Annex C. **Exceptions:** The following fans are not required to have a fan ~~efficiency grade~~energy index: **The following exception changes are optional except as discussed in the other comment pertaining to exception 1 of this section. If the exceptions here are adopted then the other comment on exception 1 is no longer relevant.** ~~1. Fans of 5 hp (3.7 kW) or less as follows:~~ ~~1.1. Individual fans with a motor nameplate horsepower of 5 hp (3.7 kW) or less , unless Exception 1.2 applies.~~ ~~1.2. Multiple fans in series or parallel as the functional equivalent of a single fan that have a combined motor nameplate horsepower of 5 hp (3.7 kW) or less and are operated as the functional equivalent of a single fan.~~ 1. Fans that are not embedded fans with motor nameplate horsepower of less than 1.0 hp (0.75 kW) or with a nameplate electrical input power of less than 0.89 kW. 2. Embedded fans that have a motor nameplate horsepower of 5 hp (3.7 kW) or less or with a fan system electrical input power of 4.1 kW or less. 3. Multiple fans operated in series or parallel as the functional equivalent of a single fan that have a combined motor nameplate horsepower of 5 hp (3.7 kW) or less or with a fan system electrical input	TAG	2	Conflict

Section or Table	Issue and Suggested Edit (if any)	Action	Priority	Type
	power of 4.1 kW or less. ~~12~~. Fans that are part of equipment covered in Section C403.3.2. ~~53~~. Fans included in an equipment package certified by an approved agency for air or energy performance. ~~4. Powered wall/roof ventilators.~~ ~~5. Fans outside the scope of AMCA 205.~~ 6. Ceiling fans, i.e., nonportable devices suspended from a ceiling or overhead structure for circulating air via the rotation of the blades. 7. Fans used for moving gases at temperatures above 425°F (250 °C). 8. Fans used for operation in explosive atmospheres. 9. Reversible fans used for tunnel ventilation. 10~~6~~. Fans that are intended to operate only during emergency conditions. 11. Fans outside the scope of AMC208.			
C403.9 Heat rejection and heat recovery equipment	The charging language and exception do not account for addition of new heat recovery sections. The current top level language and exception only apply to cooling towers not to heat recovery in sections C403.9.5 – C403.9.8. Also section C403.9.1.1 Variable flow controls (WSEC 2015) repeats in a less stringent manner the requirements of C403.9.1 Fan Speed control (src:IECC 2018), and section C403.9.1.2 (src:WSEC 2015) regulates the same thing as section C403.9.3 (src:IECC 2018). The last three sentences of the first section indicate rejection equipment must comply with C403.3.2(8) and goes on to start listing equipment. The requirement to comply with C403.3.2(8) is stated C403.3.2 with the rest of the equipment requirements. That said it is retained in this suggested language. The list the equipment types is deleted as listing individual equipment types is not done for any of the other equipment tables and will be a maintenance hassle as future versions of the table cover additional equipment The section limiting centrifugal fan open-circuit cooling towers would be better as new section C403.3.2.6 but the IECC locates it here and is left here. Suggested Action: Add new sub-sections for “Heat rejection equipment” and “Heat recovery equipment” and put the current sub-sections in them. Delete C403.9.1.1 Variable flow controls since it repeats exactly the IECC requirements in C403.9.1 with a less stringent threshold. Delete C403.9.1.2 and edit C403.9.3 to remove exception (not part of WSEC 2015). Suggested Language: **C403.9 Heat rejection and heat recovery equipment.** **<***contains no text***>** **C403.9.1 Heat rejection equipment.** Heat rejection equipment, including air-cooled condensers, dry coolers, open-circuit cooling towers, closed-circuit cooling towers and evaporative condensers, shall comply with this section. EXCEPTION: Heat rejection devices where energy usage is included in the equipment efficiency ratings listed in Tables C403.3.2(1)A, C403.3.2(1)B, C403.3.2(1)C, C403.3.2(2), C403.3.2(3), C403.3.2(7) and C403.3.2(9). Heat rejection equipment shall have a minimum efficiency performance not less than values specified in Table C403.3.2(8). ~~These requirements apply to all propeller, axial fan and centrifugal fan cooling towers. Table C403.3.2(8) specifies requirements for air-cooled condensers that are within rating conditions specified within the table.~~ **C403.9.1.1 Fan speed control.** Each fan powered by an individual motor or array of motors with a connected power, including the motor service factor, totaling 5 hp	TAG	1	Conflict

Section or Table	Issue and Suggested Edit (if any)	Action	Priority	Type
	(3.7 kW) or more shall have controls and devices configured to automatically modulate the fan speed to control the leaving fluid temperature or condensing temperature and pressure of the heat rejection device. Fan motor power input shall be not more than 30 percent of design wattage at 50 percent of the design airflow. EXCEPTIONS: 1. Fans serving multiple refrigerant or fluid cooling circuits. 2. Condenser fans serving flooded condensers. ~~**C403.9.1.1 Variable flow controls.** Cooling tower fans 7.5 hp and greater shall have control devices that vary flow by controlling the leaving fluid temperature or condenser temperature/pressure of the heat rejection device.~~ ~~**C403.9.1.2 Limitation on centrifugal fan cooling towers.** Open cooling towers with a combined rated capacity of 1,100 gpm and greater at 95°F condenser water return, 85°F condenser water supply and 75°F outdoor wet-bulb temperature shall meet the energy efficiency requirement for axial fan open-circuit cooling towers.~~ **C403.9.1.2 Multiple-cell heat rejection equipment.** Multiple-cell heat rejection equipment with variable speed fan drives shall be controlled to operate the maximum number of fans allowed that comply with the manufacturer's requirements for all system components and so that all fans can operate at the same fan speed required for the instantaneous cooling duty, as opposed to staged (on/off) operation. The minimum fan speed shall be the minimum allowable speed of the fan drive system in accordance with the manufacturer's recommendations. **C403.9.1.3 Limitation on centrifugal fan open-circuit cooling towers.** Centrifugal fan open-circuit cooling towers with a combined rated capacity of 1,100 gpm (4164 L/m) or greater at 95°F (35°C) condenser water return, 85°F (29°C) condenser water supply, and 75°F (24°C) outdoor air wet-bulb temperature shall meet the energy efficiency requirement for axial fan open-circuit cooling towers listed in Table C403.3.2(8). ~~EXCEPTION: Centrifugal open-circuit cooling towers that are designed with inlet or discharge ducts or require external sound attenuation.~~ **C403.9.1.4 Tower flow turndown.** Open-circuit cooling towers used on water-cooled chiller systems that are configured with multiple- or variable-speed condenser water pumps shall be designed so that all open circuit cooling tower cells can be run in parallel with the larger of the flow that is produced by the smallest pump at its minimum expected flow rate or at 50 percent of the design flow for the cell. **C403.9.2 Heat recovery.** <*contains no text*> **C403.9.~~5~~2.1 Heat recovery for service water heating.** <*Text remains unchanged*> **C403.9.~~6~~ 2.2 Steam condensate systems.** <*Text remains unchanged*> **C403.9.~~7~~ 2.3 Refrigeration condenser heat recovery.** <*Text remains unchanged*> **C403.9.~~8~~ 2.4 Heat recovery for space heating.** <*Text remains unchanged*>			
C404.2.1 and C404.2.2	The exceptions are really alternate requirements and could be listed as compliance options in the main sections rather than as exceptions and the whole would be clearer.	TAG	3	Clarity

Section or Table	Issue and Suggested Edit (if any)	Action	Priority	Type
C404.2.1 High input-rated service water heating systems	Ef should be deleted. EF is not applicable to equipment over 1,000,000 Btuh. "and EF" should be added to number two in the multiple equipment section which is applicable to small equipment. If the Oylear language is used then only the "and EF" needs to be added. Another issue is that starting last year UEF replaced EF as the standard. It looks pretty different to me and I'm not sure replacing EF with UEF and keeping the criteria as 0.9 is appropriate. Rheem condensing residential gas fired water heaters are listed with UEF of 0.8 to 0.83.	TAG	2	Over sight
C404.2.2 High input-rated service water heating system for Group R-1 and R-2 occupancies	Confusing to me as I'm not familiar with the terminology of the various water heat options. So this may be alright or maybe not. What equipment is Item 2 referring to with "air source heat pumps"? If the provision is satisfied with 25% of the water heat being supplied with an air to water heat pump what is the purpose of exception 2. Does a heat pump water heater satisfy the requirement for an "air source heat pump"? In exception 1, does the heat pump need to be 125% more efficient than the listed efficiency? Or is that limited to the electric heater. It is not possible to get 125% better than the C404.2 listed minimum efficiency for electric water tanks, so the phrase "or an electric water heater" should be struck. Is it clear to everyone we are banning electric water heat in group R-2 unless 25% of the water heat comes from renewables or heat recovery? The gas tank rating be should be UEF rather than EF and the criteria should be lower. A condensing water heater has a UEF in the 0.8 ot 0.85 range	TAG	2	Clarity / Over sight
C404.2.2 High input-rated service water heating system for Group R-1 and R-2 occupancies	This section is inverted compared with C404.2.1. The equipment options are in the exception and the renewable / heat recovery source option is in the main requirements. The code would read better if these were reversed. Also, each of the exceptions could be listed as compliance options in the main section rather than exceptions and the whole would be clearer.	TAG	3	Clarity
C404.9 Domestic hot water meters	Is this language clear to energy code readers: "other than Group R-2 apartment and live/work units"? What about condominiums? Suggested language; **C404.9 Domestic hot water meters.** Each individual dwelling unit in a Group R-2 occupancy with central service domestic hot water systems shall be provided with a domestic hot water meter to allow for domestic hot water billing based on actual domestic hot water usage. EXCEPTION: Dwelling units in other than Group R-2 ~~apartment~~multifamily and live/work units are not required to provide domestic hot water metering at each dwelling unit where domestic hot water is metered separately for each of the following building end uses: 1. Dwelling units. 2. Sleeping units. 3. Commercial kitchens. 4. Central laundries. If change made here it should also be made in C405.7.	TAG	2	Clarity
C405.1 General	The text related to dwelling and sleeping units is confusing in several respects. This relates to changes the IECC made, issues with the mashup, and to the TAG	TAG	1	Clarity

Section or Table	Issue and Suggested Edit (if any)	Action	Priority	Type
	removing the reference to R404.1. The following issues have been identified: 1) The first sentence uses the term "this section" to refer to all of C405 while the dwelling unit sentence uses "this section" to refer to one sentence within C405.1. Need to move the sentence ("No less than . .. ")to a new section (C405.1.1) and then have the dwelling unit discussion reference that rather than "this section". Or reestablish the link to R404.1. The suggested language below implements the former as I'm assuming there was some deliberate reason to break the link to R404.1. 2) Non-multifamily dwelling units are required to meet the special application control requirements (OS or light reduction controls) and either efficacy or C405.4 power allowance requirements. The 2018 IECC has this different, requiring compliance with efficacy or with special application control and C405.4 LPA. I'm uncertain which approach is correct. The Legislative draft approach is maintained. 3) In the current draft, sleeping units totally fall through the cracks. The IECC added a sentence addressing sleeping units to C405.1 and deleted the exception in the LPA section. The WSEC draft didn't add the sentence to C405.1 and deleted the exception so currently there is no direct place that says sleeping units can comply via efficacy. There are lots of control exceptions and footnotes to the lighting power allowance tables that reference sleeping units opting for R404.1 but no spot that says they can comply that way. The IECC sentence on sleeping units should be added or the LPA exception restored. The text below adds the IECC sentence. 4) To the extent that ties with R404 are severed, then all references to R404.1 should be changed to C504.1.1, though the control exceptions could be deleted with this new format but that is not done here. 5) This chapter addresses electrical issues beyond lighting. C405.7 specifically addresses dwelling units and is not referenced in the current text. The other sections likely don't apply to dwelling or sleeping units **Suggested language** – The language below assumes that there was a reason the link to R404.1 was removed. It would be easier to just restore it. If the changes below are made, all references to R404.1 should be changed to C405.1.1. **C405.1 General.** This section covers lighting system controls, the maximum lighting power for interior and exterior applications, electrical energy consumption, vertical and horizontal transportation systems, and minimum efficiencies for motors and transformers. *Dwelling units* within multifamily buildings shall comply with ~~this section~~C405.1.1 and C405.7. All other *dwelling units* in dormitory, hotel and other residential occupancies that are not classified as multifamily residential occupancies shall comply with Section C405.2.5, and with ~~this s~~Section C405.1.1 or Section C405.4. ~~No less than 90 percent of the permanently installed lighting serving dwelling units or sleeping units shall be provided by lamps with an efficacy of not less than 60 lumens per watt or *luminaire* with an efficacy of not less than 55 lumens per watt.~~ Sleeping units shall comply with Section C405.2.5, and with Section C405.1.1 or Section C405.4. Lighting installed in *walk-in coolers*, *walk-in freezers*, *refrigerated warehouse coolers* and *refrigerated warehouse freezers* shall comply with the lighting			

Section or Table	Issue and Suggested Edit (if any)	Action	Priority	Type
	requirements of Section C410.2. Transformers, uninterruptable power supplies, motors and electrical power processing equipment in *data center systems* shall comply with Section 8 of ASHRAE Standard 90.4 in addition to this code. **C405.1.1 Dwelling and sleeping unit lighting efficacy**. No less than 90 percent of the permanently installed lighting serving dwelling units and sleeping units shall be provided by lamps with an efficacy of not less than 60 lumens per watt or *luminaire* with an efficacy of not less than 55 lumens per watt.			
C405.1 General	The residential code is using a different efficacy requirement than the standard used by the commercial code. Consider changing the language in commercial code to be the same as the residential code. Also, should this say power or lamps. The residential code uses lamps. Suggested language: No less than 90 percent of the permanently installed ~~lighting~~lamps serving dwelling units and sleeping units shall be provided by ~~lamps with an efficacy of not less than 60 lumens per watt or *luminaire* with an efficacy of not less than 55 lumens per watt.~~light emitting diodes (LED), T-8 or smaller diameter linear fluorescent lamps, or other lamps with a minimum efficacy of 65 lumens per watt.	TAG	2	Conflict
C405.1 General	*data center systems* should be italicized	Edit	3	Typo
C405.2 Lighting controls, exception 2	"is exempt from this requirement" should be deleted	Edit	3	Typo

Section or Table	Issue and Suggested Edit (if any)	Action	Priority	Type
C405.2.1 Occupant sensor controls	The section reference in the first sentence is incorrect. The sentence needs to be split into two sentences and should read: **C405.2.1 Occupant sensor controls.** Occupant sensor controls shall be installed to control lights in the following space types: 1. Classrooms/lecture/training rooms. 2. Conference/meeting/multipurpose rooms. 3. Copy/print rooms. 4. Lounges/breakrooms. 5. Enclosed officers. 6. Open plan office areas. 7. Restrooms. 8. Storage rooms. 9. Locker rooms. 10. Other spaces 300 square feet (28 m2) or less that are enclosed by floor-to-ceiling height partitions. 11. Warehouse((s.)) storage areas. 12. Enclosed fire rated stairways. 13. Service corridors. 14. Covered parking areas. Occupant sensor controls in warehouse storage areas, ~~stairways,~~corridors, and library stacks, shall comply with Section C405.2.1.~~1~~2. Occupant sensor controls in fire rated stairways shall comply with Section C405.2.1.5. Occupant sensor controls in open plan office areas shall comply with Section C405.2.1.3. Occupant sensor controls in covered parking areas shall comply with Section C405.2.1.4. Occupant sensor controls for all other spaces shall comply with Section C405.2.1.1.	Edit	1	Conflict
C405.2.1 Occupant sensor controls	Service corridor is a poorly defined concept. ASHRAE 90.1-2016 requires all corridors to have 50% off occupancy sensors. We need definition for “Service corridor” or it should be changed to “corridor”.	TAG	3	Clarity
C405.2.1 Occupant sensor controls exceptions	Add exception for shop and laboratory classrooms similar to 90.1.	TAG	2	Over sight
C405.2.1.4 Occupant sensor control function in parking garages	C405.2.1.4 automatic off requirements are unclear. Most people will implement the C405.2.2 time switch control and that is buried in this section on OS . C405.2.1.4 Occupant sensor control function in parking garages. Occupant sensor controls shall be configured to comply with all of the following: 1. Lighting power of each luminaire shall be automatically reduced by a minimum of 30 percent when there is no vehicle or pedestrian activity detected within a lighting zone for 20 minutes. Lighting zones for this requirement shall be no larger than 3,600 square feet. Exceptions: 1.1. Lighting in daylight transition zones and ramps without parking. 1.2. Covered parking garages with a total lighting power less than 0.07 watts per square foot. 2. Where C405.2.2 time switch controls are not installed, the occupant sensor shall ~~A~~automatically turn all the lighting off within 20 minutes of all occupants leaving the space and restore lighting to full power when occupants enter the space~~, or comply with Section C405.2.2 to turn lighting off when the building is vacant~~.	Edit / TAG	3	Clarify

Section or Table	Issue and Suggested Edit (if any)	Action	Priority	Type
C405.2.2.1 Time switch control function	Section reference in first sentence should be C405.2.3.1 rather than C405.2.2.2. A better fix is to strike the whole sentence. In the legislative draft light reduction control is required everywhere there is manual control (C405.2.3), not just where there is a time switch. Having an extra reference to it in this section is confusing. Suggested language: **C405.2.2.1 Time switch control function.** ~~Each space provided with time switch controls shall also be provided with a manual control for light reduction in accordance with Section C405.2.3.1.~~ Time switch controls shall comply with the following:	TAG	3	Clarity
C405.2.2.1 Time switch control function, item 6	Why are storage room and restroom lighting listed in this exception to time switch control? They are required to have OS control so are not required to have time switch control ever. This exception is meaningless and should be struck.	TAG	4	Conflict
C405.2.3 Manual controls	New item 3, maximum control area, makes not sense. A room of 9999sf needs at least 4 switches but one of 10000sf only needs one. Suggested change: Each control device shall control an area no larger than a single room, or 2500 square feet, whichever is less if the room area is less than or equal to 10,000 square feet, or one-quarter of the room area or 10,000 square feet whichever is less if the room area is greater than 10,000 square feet"	TAG	4	Over sight
C405.2.5 Addition Lighting Controls item 3	This item reads like it applies to all dwelling units but only non-multifamily dwelling units are sent here from C405.1. The reference to time switch controls is incorrect. Suggested language: 3. Permanently installed luminaires within dwelling units in non-multifamily buildings shall be provided with controls complying with either Section C405.2.1.1 or C405.2.2~~.2~~.	Edit / Tag	3	Clarify
C405.2.5 Additional lighting control, item 1	90.1 requires these applications to be separately controlled and states these lighting applications shall be separately controlled without trying to re-specify which controls are required. IECC, trying to make things simpler, has made a mess of the requirements. This new language no longer requires the automated controls to be separately from the general lighting. It is reasonable that OS control is not required to be separate but time switch is important. In retail cases should turn off at store close while the general lighting stays on for hours during restocking. Also, lighting should comply with C405.2.1 and C405.2.2 rather than C405.2.1.1 and C405.2.2.1 so that spaces required to have OS control do have OS control and those with OS control don't need time switch. Suggested language: The following lighting shall ~~be controlled by an occupant sensor~~ comply~~ing~~ with Sections C405.2.1~~.1 or a time switch control complying with Section~~and C405.2.2~~.1. In addition~~ and be provided with a manual control. The manual and any time switch controls for these applications shall ~~be provided to~~ control ~~such~~ lighting separately from the general lighting in the space:	TAG	2	Over sight

Section or Table	Issue and Suggested Edit (if any)	Action	Priority	Type
C405.4.1 Total connected interior lighting power	Exception 3 exempts lighting in spaces specifically designed for use by occupants with special lighting needs including visually impaired but the code allowances include all kinds of categories specifically targeted at the same spaces. This results from the exception being from the IECC while the allowance categories used in here and in the IECC are from 90.1 which does not have this exception. A further issue is the definition used in the exemption is open ended and could result in extensive hair splitting during the permit process. Suggested remedy: Delete exception 3 since 90.1 is the original source for all this and it doesn't have the exception.	TAG	2	Conflict
C405.4.1 Total connected interior lighting power	Exception 19 exempts furniture mounted supplemental task lighting but lighting allowances have special allowance for that lighting type. Delete the allowance which is limited to certain space types or delete the exception which applies to all space types.	TAG	2	Conflict
C405.4.1 Total connected interior lighting power	Clause in LVL text ", which must be minimum 60 lumen/watt" is not consistent with purpose of this equation. If there is a requirement for line voltage lamps to exceed 60 lumens per watt it should be in a different section – say inserted as a new sub section to C405.4. Being in the LVL description sounds like the user should perhaps use the installed lamp or lamp producing the same light but at 60 lumens/watt whichever is less. This would be incorrect. And it is certainly not clear that line voltage lamps have to be >60 lumens per watt. **This is certainly an odd placement of this requirement.**	TAG	2	Clarity
C405.4.2(2) (table)	Atrium titles • The atrium space titles state the allowances are "per foot" but the allowances for options 1 and 3 are the total allowance. If options 1 or 3 are selected remove "(per foot)" • "First 40 feet in height" should be revised to "40 feet or less in height" to clarify that it does not apply in any way to atriums over 40 feet. • "Above 40 feet in height" should be revised to "more than 40 feet in height" to clarify that it is the sole allowance for atriums over 40 feet in height.	Edit	2	Over sight
C405.4.2(2) (table), category comments	The review document has a new lighting category "Parking Facility, dedicated ramp" that does not appear in any of the minority reports or in 90.1. This category represents a 66% increase in lighting power over WSEC 2015 in parking structures and it should not be included. The current code covers parking garages including parking spots and driving areas. This new category introduces confusion in that some may apply it to the whole parking facility if the facility has a dedicated ramp anywhere. It is further ambiguous in that most drive areas in garages are dedicated even as they pass between parking spots. Please delete this category. If it stays make it clear what it applies to . 90.1 uses the term "ramps without parking" to exempt some areas from parking controls. I'm not sure whether this is the area intended to be covered by this new category but if it is then the category should be changed to the ASHRAE language. The engine bay category, proposed as part of option 1, and included in options 2 and 3 in the review document, conflicts with the existing specific allowance for Emergency Vehicle Garage. Recommend deleting this value or at a minimum change the allowance so two categories should have the same allowance.	TAG	2	Over sight

Section or Table	Issue and Suggested Edit (if any)	Action	Priority	Type
C405.5.1 Exterior building grounds lighting	EL122-2018 modified this section and it is not represented in the draft. The TAG proposal log on the SBCC web site indicates it was modified and approved. **C405.5.1 Exterior building grounds lighting.** All exterior building grounds luminaires that operate at greater than ~~100~~ 50 watts shall have a minimum efficacy of ~~80~~ 100 lumens per watt unless the luminaire is controlled by a motion sensor or qualifies for one of the exceptions under Section C405.5.2. **Exceptions:** 1. Solar-powered lamps not connected to any electrical source. 2. Luminaires controlled by a motion sensor. **3.** Luminaires that qualify for one of the exceptions under Section C405.5.2.	Edit / TAG	1	Over sight
C405.5.3.1 Additional exterior lighting power	The language in this section is unclear. Suggested change: **C405.5.3.1 Additional exterior lighting power.** ~~Any increase in the exterior lighting power allowance is limited to the specific lighting applications indicated in Table C405.5.3(3). The additional power shall be used only for the luminaires that are serving these applications and shall not be used for any other purpose.~~ Additional lighting power is allowed for specific lighting applications indicated in Table C405.5.3(3). For each application, the additional power allowance shall be the value listed in Table C405.5.3(3) or the wattage of the installed luminaires serving the application whichever is less.	TAG	3	Clarity
C405.8 Electric motor efficiency, exception 5	The referenced section, C403.8.4, has efficacy requirements rather than "high efficacy" requirements. Suggested edit: 5. Fan motors that are not covered by Tables C405.8(1) through C405.8(4) and are used to power heat recovery ventilators, energy recovery ventilators, or local exhaust fans in Group R subject to the ~~high~~ efficacy requirements of Section C403.8.4.	TAG	3	Clarity
C406	The new mixed use area weighted average can be interpreted two ways 1) The credits for a single measure occurring in a building with multiple occupancies can be averaged across the use types to get a single value, and 2) totally different credits can be averaged as in the upper floor residential can be averaged with the lower floor non-res that applies for different credits. I think either is okay but it requires all the threshold language to recognize occupancy use as in 90% of the water use in the occupancy area. But language in several options limits them to whole buildings, additions, or TI using some phrase like "90% of the whole buildings" area or capacity. New threshold language needs to be developed for options thresholds. This is particularly applicable to Group R where first floor retail with 5 floors of Group R where the current language would eliminate the hot water measures where in the ideal world the Group R would do the hot water and the Group M and B would do other things.	TAG	2	Over sight

Section or Table	Issue and Suggested Edit (if any)	Action	Priority	Type
C406.1	The added sentence is awkward and perhaps wrong. The qualifier "conditioned space" seems to functionally eliminate low energy space from consideration. It is possible to interpret this in such a way that an office / un conditioned warehouse building would satisfy this new sentence by having 6 credits in the office area even though the low energy half is supposed to have 3 credits. Current code language: **C406.1 Additional energy efficiency credit requirements.** New buildings and changes in space conditioning, change of occupancy and building additions in accordance with Chapter 5 shall comply with sufficient packages from Table C406.1 so as to achieve a minimum number of 6 credits. Mixed use buildings shall have a conditioned space area weighted average number of credits by building occupancy of at least 6 credits.	TAG	2	Over sight
C406.1 Additional energy efficiency credit requirements	Current language is awkward. C406.1 Additional energy efficiency credit requirements. ~~New buildings and changes in space conditioning, change of occupancy and building additions~~New buildings, additions, initial tenant improvements, and buildings or spaces under going a change in space conditioning or occupancy in accordance . . .	Edit	3	Clarity
C406.1.1 Tenant spaces	The TAG passed EO125 and EO126. The legislative language does not reflect EO126. The intent of EO126 was to require initial tenant improvements to meet the same number of credits as new buildings so that projects developed as shell/core with a subsequent initial TI permit didn't have an advantage over buildings where shell and interior are permitted at the same time. The TAG discussion assumed EO125 would be changed so initial TI had to comply with the same number of credits. At a minimum C406.1.1 should require 6 credits. Suggested Text: C406.1.1 Tenant spaces. Initial tenant improvement shall comply with sufficient packages from Table C406.1 so as to achieve a minimum number of ~~three~~ six credits ~~from Section C406.2, C406.3, C406.4, C406.6 or C406.7, where applicable~~. In buildings with multiple tenant spaces, each tenant space is permitted to comply individually. Where the building area encompassing the tenant space ~~an entire building~~ complies with Section C406.5, C406.10 or C406.11 for the whole building, tenant spaces within the building area~~shall~~ can claim associated credit based upon the tenant occupancy~~be deemed to comply with this section~~.	Edit / TAG	1	Over sight
C406.3.1 and C406.3.2 Reduced lighting power	Language of section option in these sections is not consistent with the rest of the sentence. Change: "or by using 90 percent" to "or 90 percent or less" "or by using 80 percent" to "or 80 percent or less"	Edit	2	Typo
C406.3.3 Lamp Fraction	The use of "high efficacy" here is potentially confusing. It is not defined in the commercial code but is in the residential code and in dwelling units people will be using both codes. The word "high" should be deleted here unless the term is defined in this code.	TAG	3	Conflict

Section or Table	Issue and Suggested Edit (if any)	Action	Priority	Type
C406.8 Reduced energy use in service water heating	The new text leading off this section might lead some to think the systems need to be central systems which I do not believe is the intent. There should be the possibility of complying with this credit in buildings with multiple condensing or heat pump water heater systems. Also the limits based upon occupancy refer to building which means mixed use will have a difficult time utilizing this. **C406.8 Reduced energy use in service water heating.** Buildings with service hot water heating equipment and systems that serves the whole building, building addition or tenant space shall comply with Sections C406.8.1 and C406.8.2. "Buildings, building additions or tenant spaces with all service hot water supplied by equipment located in the space"	TAG	2	Clarity
C406.9 High performance service water heating in multifamily buildings	Edit: Text indicates that buildings doing this can also claim "C406.8.2". This should be "C406.8".	Edit / TAG	3	Clarity
C406.9 High performance service water heating in multifamily buildings	TAG: If the text added to C406.8 about the temperatures at which the COP is taken is important then it should be added in this credit as well.	TAG	3	Clarity
C408.1.2.1 In-House Commissioning Disclosure and Conflict Management Plan.	I'm not sure this section says what we want. The CCPs employment would almost always be with the company they work for and not with the building owner so they will all need to fill this out. Or perhaps that is the intent, in which case the code should just say that. I think the intent is to isolate CCP's that are contracted to or employed by the design and construction team. I was not able to contact Treasa Sweek whose proposal this was but that should be done before my suggested language is used. Suggested language: **C408.1.2.1 In-house commissioning disclosure and conflict management plan.** ~~Where the certified commissioning professional's contract or employment is other than directly with the building owner~~ If the certified commissioning professional has a contractual or business relationship with or is an employee of any company involved in the design or construction of the facility, an in-house commissioning disclosure and conflict management plan shall be a part of the commissioning process. A copy shall be included in the commissioning plan. This plan shall disclose the certified commissioning professional's contractual relationship with other team members and provide a conflict management plan demonstrating that the certified commissioning professional is free to identify any issues discovered and report directly to the owner.	TAG	3	Clarity
C408.1.2.3 Functional performance testing	So if there are 7 similar systems 7 need to be tested. But if there are 8 and half have one control scheme and the other half have another then only 2 need to be tested? Seems like this section needs work. There is an apple to oranges issue between the two cases as well in that "similar systems" is different than "unique control of control types".	TAG	3	Over sight

Section or Table	Issue and Suggested Edit (if any)	Action	Priority	Type
C409.1 General	New requirement is confusing to apply for buildings without PV or the electric car charging or both of these end uses. Do they need to install a meter any way a la solar ready? Does this apply to charging stations for forklifts and floor polishers? Does this apply to solar hot water? Could add "with renewable energy production" to first and "with electric vehicle charging to the second. **Yes, I can see the intent, to make sure that EV ready and PV ready buildings be capable of being metered, but the actual referenced code sections say that you can have a local totalizing meter for either of them, and you can't really "configure" a meter for a system that doesn't exist. Also the phrase "and additions" could result in some pretty goofy applications of this section. Also, it should refer to C409.3.4, not 3.3.** **I'd say, strike the whole thing.** Current text – sorry no suggested language: "All new buildings and additions, regardless of size, shall have the capability of and configured to meter on-site renewable energy production in accordance with Section C409.2.4 and the end-use energy usage for electric vehicle charging in accordance with Section C409.3.3. ".	TAG	2	Clarity
C409.3 End use metering	The phrase "not required to be included in other end-use categories" is unclear and perhaps wrong. The intent is that tenants' end-use data does not need to be aggregated with the end use data for the whole building. This should be stated directly: Suggested language" not required to be included in ~~other end-use categories~~ the building total end-use consumption	TAG	4	Clarity
C501.1 Scope C503 Initial Tenant Improvements	It is not real clear how initial tenant improvements should be treated in the code. C503 Section C503.4.2 items 1.3 and 2.2 mention initial tenant improvements as if C503 is the governing section. If this is the case then I think they should be mentioned at the beginning of C503 and that the section should be read carefully to insure it covers the basis for this type. If this section is not for initial TI then that maybe should be stated at the beginning and the C503.4.2 items referring to initial TI should be deleted or edited. Suggested Language: **C501.1 Scope.** The provisions of this chapter shall control the *alteration*, *repair*, *addition* and change of occupancy of existing buildings and structures. Initial tenant improvements are not governed by this chapter. **C503.1 General.** Alterations to any building or structure shall comply with the requirements of Section C503 and the code for new construction. Initial tenant improvements are not alterations and are considered new construction by the code.	TAG	2	Clarity
C502.1 Additions	C406 indicates additions have to comply with C502 and C406.1 exception 2 specifies the number of credits required based upon the addition size C502 does not list C406 as a section additions need comply with. Suggested language: *Additions* shall comply with Sections C402, C403, C404, C405, C406, C409.5, C410 and C502.2.	TAG	2	Oversight
C502.2.1 Vertical fenestration	Need to clarify how the WWR is calculated when an addition complies on the basis of "addition area only". Section C402.4.1 is very explicit this is for the whole building but it is really hard to imagine complying for the addition only would have to include the whole building in the WWR.	TAG	2	Clarification

Section or Table	Issue and Suggested Edit (if any)	Action	Priority	Type
C502.2.2 Skylights	C502.2.2 item one has been copied from C502.2.1 and is in error as there are no vertical glazing alternates for skylights. Only issue is whether it would be acceptable to comply with SRR based upon the addition only (that is the SRR of the addition). Otherwise we should delete this rather than revising. Suggested language: ~~1. Vertical fenestration alternate per Section C402.4.1.1 or C402.4.1.3 for the *addition* area of the building only.~~	TAG	2	Clarity
C503.2 and Exception 3	Approved E161 and E162 for Sections C503.2 and C505.1 were not correctly combined. Currently exception 3 is a repeat of exceptions 1 and 2 but is limited to buildings permitted prior to WSEC 2009, it is therefore more stringent. Due to the duplicity, either exceptions 1 and 2, or exception 3, should be deleted. If exceptions 1 and 2 are deleted and 3 kept then the last sentence of exceptions 1 and 2 should be copied to ends of 3.1 and 3.2. If exception 3 is deleted then the limit to pre-WSEC 2009 buildings should be applied to exceptions 1 and 2.though I cannot find where that came from.	Edit / TAG	2	Conflict
C503.3.2 Vertical fenestration	Exceptions 2 and 3 should be deleted and the 110 percent grace included directly in options 3 and 4. **C503.3.2 Vertical fenestration.** The addition of *vertical fenestration* that results in a total building vertical fenestration area less than or equal to that specified in Section C402.4.1 shall comply with Section C402.4. Alterations that result in a total building vertical fenestration area greater than specified in Section C402.4.1 shall comply with one of the following: 1. Vertical fenestration alternate in accordance with Section C402.1.3 for the new vertical fenestration added. 2. Vertical fenestration alternate in accordance with Section C402.4.1.1 for the area adjacent to the new vertical fenestration added. 3. Existing building and alteration area are combined to demonstrate compliance with the component performance alternate with ~~target area adjustment~~ in accordance with Section C402.1.5 for the whole building. <u>The Proposed Total UA is allowed to be up to 110 percent of the Allowed Total UA</u>. 4. Total building performance alternative in Section C407 for the whole building. <u>The annual carbon emissions from energy consumption of the proposed design is allowed to be up to 110 percent of the annual carbon emissions from energy consumption allowed.</u> EXCEPTIONS: 1. Additional envelope upgrades are included in the project so the addition of vertical fenestration does not cause a reduction in overall building energy efficiency, as approved by the *code official*. ~~2. Where the component performance alternative for the whole building is used to demonstrate compliance with this section, the Proposed Total UA is allowed to be up to 110 percent of the Allowed Total UA.~~ ~~3. Where total building performance for the whole building is used to demonstrate compliance with this section, the annual carbon emissions from energy consumption of the proposed design is allowed to be up to 110 percent of the annual carbon emissions from energy consumption allowed in Section C407.3.~~	Edit / TAG	3	Clarity

Section or Table	Issue and Suggested Edit (if any)	Action	Priority	Type
C503.3.2 Vertical fenestration	"in accordance with" is not an improvement over "per". The fact that the IECC is full of "in accordance with" does not make it something we should use everywhere. I suggest the language be changed to be more direct. Suggested language: shall comply with one of the following: 1. C402.4.1.3 Vertical fenestration alternate ~~in accordance with Section C402.4.1.3~~ for the new vertical fenestration added. 2. C402.4.1.1 Vertical fenestration alternate ~~in accordance with Section C402.4.1.1~~ for the area adjacent to the new vertical fenestration added.	Edit / TAG	4	Clarity
C503.3.3 Skylights	Following the form of changes to C503.3.2, Exceptions 2 and 3 should be deleted and the 110 percent grace included directly in options 1 and 2.	TAG	3	Clarity
C503.4.3 Alterations or replacement of existing cooling systems	If either of these conditions are true then the equipment should comply with Table C503.4 so the "and" should be an "or". Capacity is the proper word for size and these are the installed capacities not the limits so "limit" is struck. Suggested language: System alterations or replacement shall comply with Table C503.4 when the individual cooling unit capacity~~size limit~~ ~~and~~or the building total capacity ~~limit~~ of all cooling equipment without economizer do not comply with Sections C403.3.5 or C403.5.	TAG	2	Clarity / Oversight
C503.4.4 Controls for cooling equipment replacement	This section should read: When space cooling equipment is replaced, controls shall comply with all requirements under Section C403.3.5 and related subsections, ~~and~~or Section C403.5.1 for integrated economizer control.	TAG	2	Oversight
C503.6 Lighting, controlled receptacles and motors	The receptacle control language requires controls on some receptacles and allows others to be uncontrolled. It applies to all receptacles. Suggested change: Alterations or the addition of lighting, ~~controlled~~electric receptacles and motors shall comply with Sections C503.6.1 through C503.6.6.	Edit / TAG	2	Clarity
C6 - Chapter 6	Reference standards should be updated. They should also reflect the standards that will be in effect in 2020 (e.g. ASHRAE 90.1-2019)	Edit	3	Clarity
D601.7 Miscellaneous equipment	"power and" should probably be "and power"	Edit	3	Typo
E - Appendix E Renewable Energy	This section addresses double counting of renewables with C406 but not with other areas of code that exempt various things as a result of solar. Suggested language: ~~If the on-site renewable energy option in C406 is selected, this energy shall be in addition to that required by C406.~~The on-site renewable used in this option shall be separate from on-site renewables used as part of Section C406 or used to qualify for any exception in this code.	TAG	3	Oversight

Section or Table	Issue and Suggested Edit (if any)	Action	Priority	Type
F - Appendix F Outcome-based energy budgets	F101.4 it appears to allow renewable energy production to be included in the EUI (as a negative term) and if on-site generation exceeds current usage the power sold to the grid can also be subtracted. This is not definitively stated. It needs to be clarified how on-site generation is handled in the EUI. Is it included at all? Can power in excess of use be netted out with power purchased at other times?	TAG	3	Clarity
F101.3.3 Maximum site energy budget	Buried in this reference to the site EUI budgets in table F101.3.2 is a call out "along with building enclosure requirements for all use and occupancy types". It doesn't really say these are requirements or maximum values and it is weird to have two totally different things in the same table. F101.3.2 needs to be split in two with EUI budgets in one and envelope requirements in another. The reference to the envelope table should be in its own section, probably inserted as F101.3 and titled Envelope requirements and it should be clear that these are maximum values. Also, it seems like it might be good to put the window factors into the same categories (AW vs non-AW) that are going to be used in C403 rather than metal and non-metal.	TAG	3	Clarity