

To whom it may concern,

Below are comments for the public testimony on the draft 2018 WSEC created by the mechanical engineering group at McKinstry Company. There has been a lot of great work to date and these comments are intended to make the already proposed code language and to create less confusion once the code is adopted. If further clarification is required, please let me know and our team would be more than happy to provide that clarity.

Thanks!

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GENERAL

SECTION C101 – SCOPE AND GENERAL REQUIREMENTS

- **C101.4.1 –**
 - Comment: Clarify any exceptions to this rule. For example, are the residential and commercial portions of the building each expected to show compliance with C402.1 for prescriptive insulated envelope requirements, or can tradeoffs cross between Resi and Non-Resi portions? Or, how would C403.2.11.1 allowable fan motor horsepower apply to a DOAS system serving both Resi and Non-Resi floors?
 - Recommendation for code language: “C101.4.1 Mixed residential and commercial buildings. Where a building includes both residential building and commercial building portions, each portion shall be separately considered and meet the applicable provisions of WSEC-Commercial Provisions or WSEC-Residential Provisions. **Exception: The whole building or whole systems are ruled to comply if the WSEC Commercial Provisions are met.**”
- **C101.5 –**
 - Comment: Revise this section to match comment BK[1]: EG001-2018 in C101.2. Otherwise, C101.2 places ≤ 3 floor multifamily projects under the commercial code, but this section allows them to use residential energy code. The revision below is based on the Ch2 Residential Building definition.
 - Recommendation for code language: “C101.5 Compliance. **Residential buildings Detached one and two-family dwelling and multiple single-family dwellings (townhouses)** shall meet the provisions of WSEC-Residential Provisions. Commercial buildings **and all other Residential Buildings** shall meet the provisions of WSEC-Commercial Provisions. “

SECTION C202

SECTION C202 –GENERAL DEFINITIONS

- **Residential –**
 - Comment: "Renewable Energy Generation" is not currently defined, but is an important reference in Appendix F. Recommendation to add the definition of renewable energy generation (per RCW 80.60.010):
 - Recommendation for code language: **"RENEWABLE ENERGY. Energy generated by infrastructure that uses water, wind, solar energy, or biogas from animal waste as fuel."**
 - Comment: Residential Building - Revise this section to match comment BK[1]: EG001-2018 in C101.2. Otherwise, C101.2 places ≤ 3 floor multifamily projects under the commercial code, but this section allows them to use residential energy code. The revision below is based on the text in the revision to C101.2.
 - Recommendation for code language: "RESIDENTIAL BUILDING. For this code, includes detached one- and two-family dwellings and multiple single-family dwellings (townhouses) **as well as Group R-2 and, R-3 and R-4 buildings three stories or less in height above grade plane."**

SECTION C402

SECTION C402 – BUILDING ENVELOPE REQUIREMENTS

- **C402.1.5**
 - Comment: The definition of "UA-glaz-allow" includes a reference to Section C402.4.1.3 however that section does not exist.
- **C402.1.5.2**
 - Comment: Equation 4-3 - The definition of "SHGCxA-glaz-allow" includes a reference to Section C402.4.1.3 however that section does not exist.
- **C402.4.1**
 - Comment: The above-grade wall definition in C202 can be confusing when looking at a building's above-grade window / wall ratio, especially when there are above-grade walls with elevations below adjacent grade. For example, interior elevator lobby walls in a below grade parking garage. We suggest those glazing and wall areas be excluded from glazing limitation calculations.
 - Recommendation for code language: "...Interior partition ceiling, wall, fenestration, and floor areas that separate space conditioning areas shall not be applied to the window-to-wall ratio and skylight-to-roof ratio calculations. **Interior partitions between conditioned and unconditioned interior spaces, such as a parking garage, shall not be applied to the window-to-wall ratio and skylight-to-roof ratio calculations."**
- **C402.4.1.1**
 - Comment: Suggest deleting the final sentence of Section C402.4.1.1 to ensure consistency with the intent behind C407.3.1 as described in EP143-2018.
 - Recommendation for code language: **"These alternates are not permitted to be used for Total Building Performance compliance in Section C407."**

SECTION C403

SECTION C403.1 – GENERAL

▪ Section C403.1.1 Exception 8

- Comment: Without the TSPR tool available to review, it is unclear the TAG's intent of how the TSPR would apply to existing building mechanical retrofits. If the standard reference baseline assumes new system requirements, it will be very difficult to for a partial mechanical retrofit to comply at any scale and discourage upgrades to inefficient systems. Since "substantially replace" is difficult to define, suggest updated wording to be more specific.
- Recommendation for code language: "8. Alterations to existing buildings that do not ~~substantially replace the~~ replace all energy-consuming components of the entire HVAC system."

SECTION C403.3 – EQUIPMENT SELECTION

▪ C403.3.6

- Comment: This section appears to conflict with C403.7.6 (previously C403.5 in 2015 WSEC), where heat recovery is determined by system size and, even then, often excluded due to exception (#10). This section also appears to conflict with the Washington Mechanical Code section 403.8, which allows for exhaust-only ventilation and operable windows/permanent openings (trickle vents). Is it the intent of the TAG that this approach no longer be allowed? If so, WMC 403.8 must be wholly revised and Exception 10 to C403.7.6 must be removed (both having significant impact to projects). If not, here is a suggested edit which clarifies the language and would still encourage heat recovery, when a supply ventilation fan is used. (and see proposed edit to remove Exception 10 to C403.7.6)
- Recommendation for code language: "C403.3.6 Ventilation for Group R-2 occupancy. For all Group R-2 dwelling and sleeping units served by a central or local dedicated outside air system, a ~~balanced ventilation system with~~ heat recovery system with minimum 60 percent sensible recovery effectiveness shall provide outdoor air directly to all habitable spaces. The ventilation system shall allow for the design flow rates to be tested and verified at each habitable space as part of the commissioning process in accordance with Section C408.2.2. Exception: Whole house supply systems are allowed per Washington State amendments to the International Mechanical Code section 403.8.5.2, when the dedicated outside air system delivers ventilation air to each habitable unit, and air is distributed to each habitable space by a supply or transfer fan."

SECTION C403.5 – ECONOMIZERS

▪ C403.5 Exception 7.2.2

- Comment: This is an important clarification that McKinstry strongly supports because it creates a clear path to using technology that has proven energy savings performance.

- Recommendation for code language: “**7.2.3 Heat recovery chillers shall have a minimum COP of 7.0 when providing heating and cooling water simultaneously.**”
- **C403.5 Exception 9**
 - Comment: This exception has two typos: the first omits the word "side" to be consistent with the system description previously used in this section. The second typo reflects the plurality of systems being described.
 - Recommendation for code language: “Dedicated outside air systems (**DOAS**)...” “...that modulates the airflow...”

SECTION C403.6 – REQUIREMENTS FOR MECHANICAL SYSTEMS SERVING MULTIPLE ZONES

- **C403.6.1.2**
 - Comment: This section discusses control requirements for VAV systems with DDC but it is located inside of a section specifically identifying minimum airflow targets for VAV systems.
 - Recommendation for code language: Move C403.6.1.2 and all subsections to a new subsection in C403.4 and update section references.

SECTION C403.7 – VENTILATION AND EXHAUST SYSTEMS

- **C403.7.2 –**
 - Comment: With the proposed revision, it is unclear whether the 500sf applies to all space types listed or just spaces with 24 people per 1000 sf. This could mistakenly be interpreted as requiring occupancy sensors in all classrooms and conference rooms regardless of size.
 - Recommendation for code language: “**Spaces larger than 500 square feet of floor area that are either classified as** classrooms, gyms, auditoriums, or conference rooms, **or have** an occupant load greater than or equal to 25 people per 1000 square feet...shall have occupancy sensor control...”
- **C403.7.2 Exception 2**
 - Comment: The proposed exception intends to allow a minimum ventilation rate per square foot even when space is unoccupied, in order to improve IAQ. This would increase a system's minimum ventilation rate and increase system energy usage.
 - Recommendation for code language: Suggest either restricting this exception to specific space types, allowing minimum ventilation for a restricted amount of time, or striking altogether.
- **C403.7.6**
 - Comment: Please see comments in section C403.3.6. If the intent of added section C403.3.6 is to require heat recovery for multifamily buildings, Exception 10 needs to be modified or removed. The suggested revision below is intended to trigger heat recovery requirements for multifamily buildings, except when ventilation supply air is by operable windows and/or trickle vents. (The original language is ineffective, as even with centralized exhaust running vertically, the exhaust is likely to terminate in multiple exhaust fans, easily reducing below 25% of the total exhaust air stream / outside air flow rate.)

- Recommendation for code language: "C403.7.6 Exception 10: Systems serving Group R dwelling or sleeping units which are ventilated by operable or permanent exterior openings per Washington State amendments to the International Mechanical Code section 403.8 where the largest source of air exhausted at a single location at the building exterior is less than 25 percent of the design outdoor air flow rate.
- Alternate recommendation for code language: "Systems serving Group R dwelling or sleeping units where environmental (not including kitchen or clothes dryer) exhaust terminates locally at the exterior of each dwelling or sleeping unit, without combining with the environmental exhaust of any other dwelling or sleeping unit the largest source of air exhausted at a single location at the building exterior is less than 25 percent of the design outdoor air flow rate."

▪ **C403.7.7.1.2**

- Comment: To be consistent with revision proposals in section C403.7.7.1.3, suggest the use of "replacement air" rather than "make-up air".
- Recommendation for code language: "...shall include heat recovery systems to preconditioned ~~makeup~~ replacement air from laboratory exhaust."

SECTION C403.8 – FAN AND FAN CONTROLS

▪ **C403.8.4 –**

- Comment: Table C403.8.4, Group R Exhaust Fan Efficacy, describes the minimum Air Flow Rate twice
- Recommendation: If stating a minimum in two separate columns, consider condensing the columns into one, and stating a range for minimum CFM (i.e. "10 < X < 90 Air flow Rate Minimum, 2.8 cfm/watt Minimum Efficacy")

SECTION C403.9 – HEAT REJECTION AND HEAT RECOVERY EQUIPMENT

▪ **C403.9.1.2**

- Comment: Consider conflict for existing buildings where there is limited space to increase the footprint of the replacement cooling tower.
- Recommendation: Add replacement cooling towers to the exceptions listed in section C403.9.3.

▪ **C403.9.6, C403.9.7 & C403.9.8.1**

- Comment: Consider including sizing criteria for systems.

▪ **C403.9.8**

- Comment: This section is unclear with application to electric reheat systems and hydronic reheat systems with design temperatures of 180F/160F.
- Recommendation for code language: "A condenser heat recovery system meeting the requirements of C403.9.8.1 through C403.9.8.4 shall be installed to serve hydronic heating systems in buildings meeting the following criteria: ... Exception 1: Systems complying with Section C403.3.5 Dedicated outdoor air systems (DOAS). Exception 2: Existing building systems with return water temperatures exceeding 120°F."

▪ **C403.9.8.2**

- Comment: This section seems to be requiring cooling coils and filters in all the exhaust ductwork which is an economically difficult solution.
- Recommendation for code language: "Heat shall be recovered by the ~~condenser~~ heat recovery chiller system from 90 percent of the total building exhaust airflow."
- **C403.9.8.4**
 - Comment: This section states, "The minimum total combined capacity of heat recovery chillers or water to water heat pumps shall match the total combined capacity of equipment meeting the requirements of Sections C403.9.8.2 and C403.9.8.3." The sections listed (C403.9.8.2 and C403.9.8.3) do not indicate the heat recovery chiller capacity.

SECTION C406

SECTION C406 – VENTILATION AND EXHAUST SYSTEMS

- **C406.1**
 - Comment: verbiage clarification
 - Recommendation for code language: "Mixed use buildings shall have a conditioned space area weighted average number of credits by building occupancy ~~of at least,~~ achieving a minimum number of six credits."
- **C406.5**
 - Comment: Code section reference update.
 - Recommendation for code language: "The on-site renewable used in this option shall be separate from on-site renewables as part of Section ~~C406.7~~ C406.8 or used to qualify for any exception in this code."

SECTION C407

SECTION C407 – TOTAL BUILDING PERFORMANCE

- **C407.2**
 - Comment: This section provides little definition for what is required to be submitted for the TBP report. We suggest including Appendix E from the 2015 SEC to provide defined report requirements.
 - Recommendation for code language: Revise sentence in C407.2 as follows "The building permit application for projects utilizing this method shall include in one submittal all building and mechanical drawings and all information necessary as defined in Appendix X to verify that the building envelope and mechanical design for the project ..."
- **Table C407.2**
 - Comment: Unclear why section C411 Solar Readiness is not a mandatory section when pursuing Total Building Performance. Suggest revising Table C407.2 to include C411 Solar Readiness as a mandatory section when pursuing TBP.
- **C407.3.1**
 - Comment: Per EP143-2018, the intent of this provision is to allow the calculation of the "allowed total envelope UA" inclusive of the high-performance alternates in Section C402.4.1.1.

- Recommendation for code language: "The proposed total envelope UA of the proposed building shall be no more than 20 percent higher than the allowed total envelope UA as defined in Section C402.1.5 inclusive of C402.4.1.1 high-performance alternates."

SECTION C410

SECTION C410 – REFRIGERATION SYSTEM REQUIREMENTS

▪ C410.2.4 Exception

- Comment: Given it is common for kitchens to be located at or below grade, this exception will reduce the impact of this requirement. Walk-in floor insulation at a slab on or below-grade can be achieved by depressing the slab or ramping into the walk-in. We recommend revising this exception to only apply to walk-ins being installed in existing buildings.
- Recommendation for code language: "Exception: Insulation is not required for the floor of a walk-in cooler that is mounted directly on an existing slab on grade. "

▪ C410.2.9 –

- Comment: Grammatical error
- Recommendation for code language: "C410.2.9. Antisweat heaters that are not provided with antisweat heater controls shall have a total door rail, glass and dram heater power draw of not greater than 7.1 W/ft2 (76 W/m2) of door opening for walk-in freezers and not greater than 3.0 W/ft2 (32 W/m2) of door opening for walk-in coolers."

SECTION C501

SECTION C501 – GENERAL

▪ C501.4.2

- Comment: Current section reference to load sizing requirements has been changed to C403.1.2.
- Recommendation for code language: "... shall be determined in accordance with Section C403.1.1 C403.1.2.

APPENDIX F

APPENDIX F – OUTCOME BASED ENERGY BUDGET

▪ F101.2

- Comment: This section requires re-certification of compliance below the required target every 5-years for an unlimited duration, with financial penalty for non-compliance at risk for every re-certification period. This is likely to drive developers and owners away from this path, as a potentially large bond or security is continually at financial risk.
- Recommendation for code language (last sentence): "Buildings that exceed the energy budget by more than 20 percent during the first three years after occupancy shall,

using a posted performance bond or financial security, offset the excess amount over 20 percent by installing renewable energy or with an energy retrofit. Buildings that exceed the energy budget by more than 20 percent after the first three years of occupancy shall offset the excess amount over 20 percent through a green power purchase agreement."

▪ **F101.2**

- Comment: Natural gas, propane, and other combustion sources are not included in renewable generation. As such, this section will significantly restrict gas usage in buildings pursuing this path or require redundant electrical capacity to replace gas infrastructure in future operations. McKinstry supports electrification initiatives and supports this general provision, but also would recommend an exception for fossil fuel use associated with emergency and optional standby sources, commercial kitchens, and specialized combustion (e.g., lab usage).

▪ **F101.3.1**

- Comment: Determining what additional services are "associated with the building" may be subject to interpretation. Vehicle recharging stations are not typically included in EUI and are likely to become an increasingly large energy user inside of a building given increased market penetration of electric vehicles.
- Recommendation for code language: (third sentence): "All secondary spaces and services (examples: exterior building and site lighting, surface parking, garages, and exterior swimming pools, and vehicle recharging stations) associated with the building within the permitted site boundary shall be included in the overall energy use total.

▪ **F101.4.1 and F101.4.2**

- Comment: Occupancy is currently undefined in the WSEC and is difficult to define, measure, and enforce, outside of considering all leased or owner occupied areas as "occupied." The requirement to re-certify and offset energy that exceeds the energy budget with renewable power purchase agreements, renewable energy, or energy retrofits provides an effective penalty against easier early compliance of a "lightly occupied" building at initial occupancy.
- Recommendation: Eliminate Section F101.4.1 in its entirety and amend Section F101.4.2 as follows: "If an area within the building changes from one occupancy use to another with a different target EUI energy budget or if the building occupancy level drops below 85%, the target EUI energy budget shall be recalculated to become the new energy budget against which the building energy use shall be compared for compliance.

▪ **F101.4.5**

- Comment: It isn't clear why energy code would seek to restrict a contractual relationship regarding an energy performance guarantee between an owner and a contractor or consultant. For example, energy performance guarantees are already common for companies operating as ESCOs.
- Recommendation: Eliminate Section F101.4.5 in its entirety.

▪ **F101.6**

- Comment: It will be difficult for AHJ reviewers to assess and enforce the value of a PV system, due to highly variable costs associated with method of installation, etc.

- Recommendation for code language (second sentence): "The bond or security shall have a value equal to ~~the cost of installing a photovoltaic (PV) system with a generating capacity equal to 20 percent of the energy budget or~~ \$4.00 per square foot of gross conditioned floor area, ~~whichever is lower.~~
- **Table F101.3.2**
 - Comment: The second part of the table referencing envelope construction values does not appear to be referenced anywhere in Appendix F.
 - Recommendation: Remove the envelope factor portion of Table 101.3.2 or provide additional requirements that reference the table.

END OF COMMENTS

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