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Statewide Utility Codes and Standards Team - Support for Adoption

Additional submitted attachment is included below.

Support for Adoption of 2019 Title 24, Part 6 Standards

California Statewide Utility Codes and Standards Team

May 7, 2018

The California Statewide Utility Codes and Standards Team (Statewide CASE Team) actively supports the California Energy Commission (Energy Commission) in developing revisions to the California Building Energy Efficiency Standards (Title 24, Part 6) by developing code change proposals that will result in feasible, enforceable, and cost-effective enhancements to the building energy efficiency standards. In developing these Codes and Standards Enhancement (CASE) proposals, the Statewide CASE Team conducts research and market surveys, holds stakeholder meetings, and evaluates the energy savings and cost-effectiveness of considered measures. The CASE Reports, which present pertinent information that supports the code change proposals, are posted within each measure topic page on title24stakeholders.com.

The four California Investor Owned Utilities – Pacific Gas and Electric Company, San Diego Gas and Electric, Southern California Edison and SoCalGas® – and several publicly Owned Utilities – Los Angeles Department of Water and Power, Sacramento Municipal Utility District, and Southern California Public Power Authority – sponsored this effort.

1. Statewide CASE Team Supports Adoption of 15-Day Language

The Statewide CASE Team strongly supports the adoption of the 2019 Title 24, Part 6 Standards. The proposed changes to the building code, as presented in the 15-Day Language, balance many interests, are a cost-effective way to help Californians reduce energy use and greenhouse gas emissions, and represent a significant milestone in the continued effort to achieve California's long-term energy and climate goals.

Throughout this code cycle, the Statewide CASE Team has had the opportunity to work collaboratively with the Energy Commission and many other dedicated stakeholders. We commend the Energy Commission for creating and maintaining a platform for open discussion, and we appreciate all the constructive dialogue that went into developing code changes that will not only save energy, but are also cost-effective, technically feasible, and enforceable. To support the implementation of the 2019 Standards, we plan to offer tools, training, and resources through the [Energy Code Ace](#) program. [Energy Code Ace](#) works directly with market actors by providing education, outreach, technical support, tools, and resources to increase compliance with the standards. The Statewide CASE Team looks forward to working with the Energy Commission and other interested parties on the next revision of the building energy efficiency standards.

2. Suggestions for Continued Improvement

While the Statewide CASE Team is supportive of adopting the 2019 Title 24, Part 6 Standards, there are opportunities to improve the clarity and precision of the language which can lead to improved compliance. In the remainder of this letter, we discuss improvement opportunities, including

suggestions to remove ambiguity and clarify methods to verify compliance. We have provided some specific examples of proposed language revisions to demonstrate the value of small language improvements. We recognize that these changes are unlikely to be incorporated into the 2019 Standards. We would welcome the opportunity to work with the Energy Commission during the 2022 code cycle to make improvements that would make language less complex throughout the entire standards, including addressing the issues identified in the remainder of this letter.

The Statewide Utility Compliance Improvement (CI) Team contributed to developing the recommendations presented below. The CI Team conducts compliance improvement activities to complement and enhance advocacy work by maximizing verified savings from codes and standards that are realized and persist over time. The CI Team engages market actors throughout the compliance supply chain to ensure that advocacy and compliance improvement activities produce solutions that meet end users' needs.

The CASE Team obtained feedback on the proposed 2019 CASE measures from building departments and other subject matter experts that assist in implementing the building code. Energy Code Ace also conducted user-centered design trainings with the CASE authors to ensure recommendations presented in the CASE Reports were developed from the end-users' perspective.

To be effective in realizing sustained energy savings, code language must make it very clear exactly what features are required. This includes ensuring that outside references documents are not required to understand the Title 24, Part 6 requirements, as in the current ventilation and indoor air quality requirements. Additionally, code language in one code section must not conflict with language in another code section, and code language must not be vague, which leaves it open to misinterpretation. Current sections of the lighting alterations requirements currently fall into both categories. Based on the CI Team's experience working with a variety of end users as they implement code requirements, interpreting the code requirements for nonresidential lighting alterations has proven to be particularly challenging.

We encourage the Energy Commission to consider the changes suggested in this document. We believe addressing these issues will reduce the potential for misinterpretation and improve compliance. Recommended revisions to the 15-Day Language are included in this document in orange. The Statewide CASE Team's recommended language insertions are double underlined and recommended language deletions are in ~~double-strikeout~~ font.

2.1 High Performance Windows and Doors

Table 110.6-A: Section 110.6(a)2 states that the U-factor of exterior door shall be rated according to NFRC 100 or designers shall use the applicable default U-factor in Table 110.6-A. However, Table 110.6-A does not include a default U-factor for opaque doors. This will cause confusion and make compliance difficult for those who install non-rated exterior opaque doors, such as custom doors. Since the U-factor requirement is not spelled out for these door types, there is a lack of clarity on what U-factor should be used. Even with this proposed change, unrated doors cannot be used in the prescriptive approach (all the U-factors for doors in Table 110.6 including the proposed U-factor for opaque doors are higher than the prescriptive 0.2 Btu/hr-sf-°F). The door U-factor requirement is essentially enforced through the performance approach. The default proposed here (U=0.5 Btu/hr-sf-°F) is a typical value for a solid wood door. Including the default U-factor for opaque doors in the footnote to Table 110.6 will provide clarity to designers what are the default U-factors for unrated opaque doors (with less than 25 percent glass they really are no longer fenestration). Having the opaque door default U-factor in the footnote Table 110.6 will reduce the possibility of confusion and provide quick feedback to designers that using unrated doors will result in a fairly significant energy penalty when using the performance approach.

It is recommended that a default U-factor be provided for opaque exterior doors by adding footnote 5.

TABLE 110.6-A DEFAULT FENESTRATION PRODUCT U-FACTORS

FRAME	PRODUCT TYPE ⁵	SINGLE PANE ^{3,4} U-FACTOR	DOUBLE PANE ^{1,3,4} U-FACTOR	GLASS BLOCK ^{2,3} U-FACTOR
Metal	Operable	1.28	0.79	0.87
	Fixed	1.19	0.71	0.72
	Greenhouse/garden window	2.26	1.40	N.A.
	Doors	1.25	0.77	N.A.
	Skylight	1.98	1.30	N.A.
Metal, Thermal Break	Operable	N.A.	0.66	N.A.
	Fixed	N.A.	0.55	N.A.
	Greenhouse/garden window	N.A.	1.12	N.A.
	Doors	N.A.	0.59	N.A.
	Skylight	N.A.	1.11	N.A.
Nonmetal	Operable	0.99	0.58	0.60
	Fixed	1.04	0.55	0.57
	Doors	0.99	0.53	N.A.
	Greenhouse/garden windows	1.94	1.06	N.A.
	Skylight	1.47	0.84	N.A.
<p>1. For all dual-glazed fenestration products, adjust the listed U-factors as follows:</p> <p>a. Add 0.05 for products with dividers between panes if spacer is less than 7/16 inch wide.</p> <p>b. Add 0.05 to any product with true divided lite (dividers through the panes).</p> <p>2. Translucent or transparent panels shall use glass block values when not rated by NFRC 100.</p> <p>3. Visible Transmittance (VT) shall be calculated by using Reference Nonresidential Appendix NA6.</p> <p>4. Windows with window film applied that is not rated by NFRC 100 shall use the default values from this table.</p> <p>5. <u>Exterior doors with less than 25 percent glazing shall have a default U-factor of 0.50.</u></p>				

2.2 High Performance Walls

The 15-Day Language is not as clear as it could be with respect to the requirements that apply to mass walls. U-factors and R-values in Table 150.1 are not consistent with the language in 150.1(c)1.B, the values in the Reference Appendix JA4, or with the mass wall assemblies applied to the Standard Design in the Alternative Calculation Method (ACM) Reference Manual and the compliance software. It is our understanding that the U-factors were originally determined based on a concrete wall with continuous insulation applied to either the interior or exterior of the wall that meets the R-value in the table. Using the JA4 Table 4.3.6 and Equation 4-4, we are not able to replicate the U-factors in the table. We suggest verifying how these U-factors were originally determined, revising the values in the table to reflect the original intent, and adding clarifying language as necessary. This will require revisions to 150.1(c)1.B, Table 150.1-A, Table 150.1-B, and the ACM Reference Manual.

The two categories of mass walls (“Interior” and “Exterior”) do not accurately represent all types of mass walls. Certain types of walls qualify as mass walls (heat capacity greater than 7.0 Btu/h-ft²), but have insulation applied in a location other than directly to the interior or exterior of the wall (e.g., concrete sandwich panels, adobe walls, log walls) or have insulation applied to both the interior and exterior (e.g., Insulating Concrete Forms or ICF). With the current language it is unclear which prescriptive requirement in Table 150.1-A & 150.1-B should be applied to these wall types. We suggest

revising the “Exterior” designation to “All others” and providing clarifying language describing these designations. Any wall with insulation applied to the interior, and thus does not have the thermal mass of the wall directly exposed to the building, would be classified under the “Interior” designation. ICF walls would fall under this designation even though they have an additional insulation layer within the assembly. All other mass walls, including concrete sandwich panels, adobe walls, log walls, and walls with exterior applied insulation, would be classified under the “All others” designation. This will require revisions to 150.1(c)1.B, Table 150.1-A, Table 150.1-B, and the ACM Reference Manual.

150.1(c)1.Bii

- ii. Mass walls above grade and below grade shall be insulated such that the wall has an assembly U- factor equal to or less than that shown in TABLE 150.1-A or B, or walls shall be insulated with continuous insulation that has an R-value equal to or greater than that shown in TABLE 150.1-A or B. “Interior” denotes ~~continuous~~ insulation installed on the inside surface of the wall, and “~~All other exterior~~” denotes all other mass walls where insulation is not applied to the inside surface of the wall~~continuous insulation installed on the outside surface of the wall.~~

**TABLE 150.1-A COMPONENT PACKAGE-A— Single Family Standard Building Design
And Table 150.1-B COMPONENT PACKAGE – Multi-fFamily Standard Building Design**

Single Family			<i>(content from table omitted)</i>	
Building Envelope	Walls	Above Grade		Framed ³
				Mass Wall Interior ^{4,5}
				Mass Wall All Others Exterior ^{4,5}
		Below Grade^{4,6}		Below Grade Interior ⁶
				Below Grade All Others Exterior ⁸

Footnote requirements to TABLE 150.1-A and Table 150.1-B

- 1- Install the specified R- value with no air space present between the roofing and the roof deck.
 - 1. Install the specified R-value with an air space present between the roofing and the roof deck. Such as standard installation of concrete or clay tile.
 - 2. R-values shown for below roof deck insulation are for wood-frame construction with insulation installed between the framing members. Alternatives including insulation above rafters or above roof deck shall comply with the performance standards.
 - 3. Assembly U-factors for exterior framed walls can be met with cavity insulation alone or with continuous insulation alone, or with both cavity and continuous insulation that results in an assembly U-factor equal to or less than the U-factor shown. Use Reference Joint Appendices JA4 Table 4.3.1, 4.3.1(a), or Table 4.3.4 to determine alternative insulation products to ~~meet~~ be less than or equal to the required maximum U-factor.
 - 4. Mass wall has a heat capacity greater than or equal to 7.0 Btu/h-ft². “Interior” denotes insulation installed on the inside surface of the wall. ~~Mass walls shall be insulated such that the wall has an assembly U- factor equal to or less than that shown or walls shall be insulated with continuous insulation that has an R-value equal to or greater than that shown~~
 - 5. “Interior” denotes insulation installed on the inside surface of the wall. “~~All other Exterior~~” denotes all other mass walls where insulation is not applied to the inside surface of the wall~~insulation installed on the exterior surface of the wall.~~
 - 6. Below grade “interior” denotes insulation installed on the inside surface of the wall; and ~~b~~Below grade “~~All other exterior~~” denotes all other mass walls where insulation is not applied to the inside surface of the wall~~insulation installed on the outside surface of the wall.~~
 - 7. HSPF means “heating seasonal performance factor.”
 - 8. When whole house fans are required (REQ), only those whole house fans that are listed in the Appliance Efficiency Directory may be installed. Compliance requires installation of one or more WHFs whose total airflow CFM is capable of meeting or exceeding a minimum 1.5 cfm/square foot of conditioned floor area as specified by Section 150.1(c)12.
 - 9. A supplemental heating unit may be installed in a space served directly or indirectly by a primary heating system, provided that the unit thermal capacity does not exceed 2 kilowatts or 7,000 Btu/hr and is controlled by a time-limiting device not exceeding 30 minutes.

10. For duct and air handler location: REQ denotes location in conditioned space. When the table indicates ducts and air handlers are in conditioned space, a HERS verification is required as specified by Reference Residential Appendix RA3.1.4.3.8.

2.3 Healthcare Facilities

Healthcare requirements refer to “Chapter 7 of the California Administrative Code (Title 24, Part 1)” using inconsistent terminology in the following sections:

- Title 24, Part 1 10-103(a) refers to “Chapter 7,” but does not specify a resource.
- Title 24, Part 6 Section 120.8 refers to “Healthcare facilities shall instead comply with the applicable requirements of Chapter 7 of the California Administrative Code (Title 24, Part 1).”

Consistent references to requirements will make it easier for building departments to improve code compliance. In every instance of Chapter 7 throughout the standards, it is recommended to use the following language: Chapter 7 of the California Administrative Code (Title 24, Part 1)

2.4 Residential and Nonresidential Indoor Air Quality

During the 2019 code cycle, the Energy Commission made many valuable changes to the indoor air quality requirements for both residential and nonresidential buildings. The revisions will help ensure that the indoor air quality remains high as buildings become more efficient. While we were able to accomplish a lot, the Statewide CASE Team would like to offer recommendations to improve the language for the 2022 code cycle.

Throughout Section 120: The Statewide CASE Team recommends that instead of referencing sections of ASHRAE 62.1 and ASHRAE 62.2, the actual code requirements from the ASHRAE Standards be replicated in Title 24, Part 6. Specifically, the minimum ventilation airflow rates and rated sound requirements should be explicitly stated in the code language. The ASHRAE Standards are a third-party standard with a cost to access and review. Stakeholders may find this to be a barrier to compliance since a fee is required to access the code requirement. In the following are instances, the ASHRAE 62.1 and 62.2 requirements should be replicated in Title 24, Part 6.

Section 120.1(b)2Aii

- i. Continuous operation of central forced air system air handlers used in central fan integrated ventilation systems is not a permissible method of providing the dwelling unit ventilation airflow required in (Section 4 of ASHRAE Standard 62.2).

Sections 120.1(b)2Avi and 120.1(b)2Biia

- vi. Kitchen range hoods shall be vented to outdoors and HVI rated for sound, to be less than or equal to 3 sones at the lowest speed above 100 cfm that the hood can produce in accordance with ~~Section 7.2 of~~ ASHRAE 62.2:7.2, and HVI 916: 7.2.

EXCEPTION to Section 120.1(b)2Avii: Kitchen range hoods may be rated for sound at a static pressure determined at working speed as specified in HVI 916 Section 7.2.

- vii. Compliance with ASHRAE 62.2 Section 6.5.2 (Space Conditioning System Ducts) shall not be required.
- viii. Compliance with ASHRAE 62.2 Section 4.4 (Control and Operation) shall require manual switches associated with dwelling unit ventilation systems to have a label clearly displaying the following text, or equivalent text: “This switch controls the indoor air quality ventilation for the home. Leave it on unless the outdoor air quality is very poor.”

B. High-Rise Residential Dwelling Unit Acceptance.

- i. **Airflow Performance.** The dwelling- unit ventilation airflow required by [Section 120.1\(b\)2Aiv](#) or [120.1\(b\)2Av](#)~~Section 4 of ASHRAE Standard 62.2~~ shall be confirmed through field verification and diagnostic testing in accordance with [Reference Nonresidential Appendix NA7.18.1](#).
- ii. **Kitchen Range Hoods.** The installed kitchen range hood shall be field verified in accordance with [Reference Nonresidential Appendix NA7.18.1](#) to confirm the model is rated by HVI to comply with the following requirements:
 - a. [The minimum ventilation airflow rate is no less than 100 cfm](#) as specified in [Section 5 of ASHRAE 62.2](#).
 - b. [The maximum sound rating as specified in Section 120.1\(b\)2Avii](#)~~section 7.2.2 of ASHRAE 62.2~~.

Section 120.1(b)1Biii: Section not numbered and as a separate requirement for a separate class of equipment needs a clearer definition. This advances the numbering of subsection 120.1(b)1Biii to iv, and iv to v.

- ii. ~~The~~All systems shall be designed to accommodate the clean-filter pressure drop imposed by the [system air filter\(s\)](#). The design airflow rate, and maximum allowable clean-filter pressure drop at the [design airflow rate applicable to each air filter device](#) shall be determined and reported on labels according to subsection iv below.

~~iii.~~ [Ducted mechanical space conditioning S](#)systems specified in [Section 120.1\(b\)1Ai](#) shall be equipped with air filters that meet either subsection a or b below:

Section 120.1(c)3: We suggest adding the phrase, “that are not naturally ventilated per item 2 above” for clarity. We also suggest striking the phrase “to the zone” to make it clear that the mechanical ventilation outdoor airflow rates are being provided at the air handler rather than the zone, as per Title 24, Part 6 (2016).

- 3. **Mechanical Ventilation.** Occupiable spaces [that are not naturally ventilated per item 2 above](#) shall be ventilated with a mechanical ventilation system capable of providing an outdoor airflow rate (V_z) ~~to the zone~~ no less than the larger of A or B as described below:

Section 120.1(c)4: The Table reference is wrong. It should be Table 120.1-B (not D).

4. **Exhaust Ventilation.** The design exhaust airflow shall be determined in accordance with the requirements in [Table 120.0-B](#) ~~420.1-D~~. Exhaust makeup air shall be permitted to be any combination of outdoor air, recirculated air, or transfer air. [ASHRAE 62.1:6.5.1]

Section 120.1(g): The Statewide CASE Team recommends providing guidance on what the four air classifications represent, specifically adding air classification definitions as table notes in Tables 120.1-A/B/C notes since that will match how other sections of code approach defining classes in tracked changes of the 45-Day Language that we provided to the Energy Commission, we recommended providing these as a definition in Section 100.0(b), which is another viable option.

Table 120.1-A – Minimum Ventilation Rates [Continued]

<u>Occupancy Category</u>	<u>Area Outdoor Air Rate R_a</u>	<u>Min Air Rate for DCV^b</u>	<u>Air Class</u>	<u>Notes</u>
	cfm/ft ²	cfm/ft ²		
Residential				
Common corridors	0.15		1	F
Retail				

Sales (except as below)	0.25	0.20	2	
Mall common areas	0.25	0.15	1	F
Barbershop	0.40		2	F
Beauty and nail salons	0.40		2	
Pet shops (animal areas)	0.25	0.15	2	
Supermarket	0.25	0.20	1	F
Coin-operated laundries	0.30		2	
Sports and Entertainment				
Gym, sports arena (play area)	0.50	0.15	2	E
Spectator areas	0.50	0.15	1	F
Swimming (pool)	0.15		2	C
Swimming (deck)	0.50	0.15	2	C
Disco/dance floors	1.50	0.15	2	F
Health club/aerobics room	0.15		2	
Health club/weight rooms	0.15		2	
Bowling alley (seating)	1.07	0.15	1	
Gambling casinos	0.68	0.15	1	
Game arcades	0.68	0.15	1	
Stages, studios	0.50	0.15	1	D, F
<p>General:</p> <p>^a Ra was determined This value assumes as being the larger of the area method and the default per person method. The occupant density used in the per person method was assumed to be one half of the maximum occupant load assumed for egress purposes in the CBC, non-fixed seating and uses the occupant density assumption in accordance with Section 120.1(c)3.</p> <p>^bIf ²If this column specifies a minimum cfm/ft² then it shall be used to comply with Section 120.1(d)4E.</p> <p>AIR CLASSIFICATIONS:</p> <p>CLASS 1 AIR is air with low contaminant concentration, low sensory-irritation intensity, and inoffensive odor.</p> <p>CLASS 2 AIR is air with moderate contaminant concentration, mild sensory-irritation intensity, or mildly offensive odors (Class 2 air also includes air that is not necessarily harmful or objectionable but that is inappropriate for transfer or recirculation to spaces used for different purposes.)</p> <p>CLASS 3 AIR is air with significant contaminant concentration, significant sensory-irritation intensity, or offensive odor.</p> <p>CLASS 4 AIR is air with highly objectionable fumes or gases or with potentially dangerous particles, bioaerosols, or gases, at concentrations high enough to be considered as harmful.</p> <p>Specific Notes:</p> <p>A – For high-school and college libraries, the values shown for “Public Assembly Spaces – Libraries” shall be used. B – Rate may not be sufficient where stored materials include those having potentially harmful emissions.</p> <p>C – Rate does not allow for humidity control. “Deck area” refers to the area surrounding the pool that is capable of being wetted during pool use or when the pool is occupied. Deck area that is not expected to be wetted shall be designated as an occupancy category.</p> <p>D – Rate does not include special exhaust for stage effects such as dry ice vapors and smoke.</p> <p>E – Where combustion equipment is intended to be used on the playing surface or in the space, additional dilution ventilation, source control, or both shall be provided.</p> <p>F – Ventilation air for this occupancy category shall be permitted to be reduced to zero when the space is in occupied standby mode.</p>				

Table 120.1-B – Minimum Exhaust Rates [ASHRAE 62.1: TABLE 6.5]

Occupancy Category	Exhaust Rate, cfm/unit	Exhaust Rate, cfm/ft ²	Air Class	Notes
Arenas	-	0.50	1	B
Art classrooms	-	0.70	2	

Auto repair rooms	-	1.5	2	A
Barber shops	-	0.50	2	
Beauty and nail salons	-	0.60	2	
Cells with toilet	-	1.00	2	
Copy, printing rooms	-	0.50	2	
Darkrooms	-	1.00	2	
Educational science laboratories	-	1.00	2	
Janitor closets, trash rooms, recycling	-	1.00	3	
Kitchenettes	-	0.30	2	
Kitchens – commercial	-	0.70	2	
Locker rooms for athletic or industrial facilities	-	0.50	2	
All other locker rooms	-	0.25	2	
Shower rooms	20/50	-	2	G,H
Paint spray booths	-	-	4	F
Parking garages	-	0.75	2	C
Pet shops (animal areas)	-	0.90	2	
Refrigerating machinery rooms	-	-	3	F
Soiled laundry storage rooms	-	1.00	3	F
Storage rooms, chemical	-	1.50	4	F
Toilets – private	25/50	-	2	E
Toilets – public	50/70	-	2	D
Woodwork shop/classrooms	-	0.50	2	

AIR CLASSIFICATIONS:

CLASS 1 AIR is air with low contaminant concentration, low sensory-irritation intensity, and inoffensive odor.

CLASS 2 AIR is air with moderate contaminant concentration, mild sensory-irritation intensity, or mildly offensive odors (Class 2 air also includes air that is not necessarily harmful or objectionable but that is inappropriate for transfer or recirculation to spaces used for different purposes.)

CLASS 3 AIR is air with significant contaminant concentration, significant sensory-irritation intensity, or offensive odor.

CLASS 4 AIR is air with highly objectionable fumes or gases or with potentially dangerous particles, bioaerosols, or gases, at concentrations high enough to be considered as harmful.

Notes:

A – Stands where engines are run shall have exhaust systems that directly connect to the engine exhaust and prevent escape of fumes.

B – Where combustion equipment is intended to be used on the playing surface, additional dilution ventilation, source control, or both shall be provided.

C – Exhaust shall not be required where two or more sides comprise walls that are at least 50% open to the outside.

D – Rate is per water closet, urinal, or both. Provide the higher rate where periods of heavy use are expected to occur. The lower rate shall be permitted to be used otherwise.

E – Rate is for a toilet room intended to be occupied by one person at a time. For continuous systems operation during hours of use, the lower rate shall be permitted to be used. Otherwise the higher rate shall be used.

F – See other applicable standards for exhaust rate.

G – For continuous system operation, the lower rate shall be permitted to be used. Otherwise the higher rate shall be used. H – Rate is per showerhead

Table 120.1-C – Airstreams or Sources [ASHRAE 62.1:Table 5.16.1]

Description	Air Class
Diazo printing equipment discharge	4
Commercial kitchen grease hoods	4
Commercial kitchen hoods other than grease	3
Laboratory hoods	4 ^a
Hydraulic elevator machine room	2

AIR CLASSIFICATIONS:

CLASS 1 AIR is air with low contaminant concentration, low sensory-irritation intensity, and inoffensive odor.

CLASS 2 AIR is air with moderate contaminant concentration, mild sensory-irritation intensity, or mildly offensive odors (Class 2 air also includes air that is not necessarily harmful or objectionable but that is inappropriate for transfer or recirculation to spaces used for different purposes.)

CLASS 3 AIR is air with significant contaminant concentration, significant sensory-irritation intensity, or offensive odor.

CLASS 4 AIR is air with highly objectionable fumes or gases or with potentially dangerous particles, bioaerosols, or gases, at concentrations high enough to be considered as harmful.

- a. Air Class 4 unless determined otherwise by the Environmental Health and Safety professional responsible to the owner or to the owner's designee.

Section 150.0(m)12D: Several sentences lack verbs.

- i. The maximum allowable clean-filter pressure drop shall be determined by the system design for the nominal two-inch minimum depth air filter required by Section 150.0(m)12Biia, or
- ii. A maximum of 25 PA (0.1 inches water) clean-filter pressure drop shall be allowed for a nominal one-inch depth air filter sized according to Section 150.0(m)12Biib, or
- iii. For systems specified in 150.0(m)12Aii, and 150.0(m)12Aiii, the maximum allowable clean filter pressure drop shall be determined by the system design.

Section 150.0(o)2: The numbering for this section should be “2” not “12”.

12-2. Field Verification and Diagnostic Testing.

2.5 Nonresidential Indoor Lighting Alterations

Exception 5 to 141.0(b)2I: The Statewide CASE Team recommends that Exception 5 to 141.0(b)2I be rewritten to clarify that the intent of the exception is not to exempt simultaneous replacement of separable lamps and ballasts or separable lamps and drivers. Exception 5 is intended to exempt replacements of light sources only, control electronics only, integrated lamps only, or LED retrofit kits only. In our experience, this has been a source of confusion in the 2016 code cycle and has limited the energy savings that could be garnered from lighting alteration projects in California. Where integral lamps are replaced the intent is to treat them like any other lamp and allow these to be exempted. Note that the modified Exception 5 applies to replacing existing components of luminaires. For clarity, a separate Exception 6 describes exempting alterations that are solely control upgrades. This exception identically matches Exception 1 to Section 141.0(b)2K in the 2016 version of Title 24, Part 6.

EXCEPTION 5 to Section 141.0(b)2I: ~~Any alteration limited solely to adding lighting controls or replacing lamps, ballasts, or drivers~~ Alterations where the luminaire housing is retained and lighting wattage is not increased for any of the following:

1. Alterations where only the lamp or only the ballast is replaced, or
2. Alterations where only an integrated LED lamp or CFL is replaced, or
3. Alterations where only a non-integrated LED lamp or only the LED driver is replaced, or
4. Alterations where an LED light engine or LED retrofit kit is replaced.

EXCEPTION 6 to Section 141.0(b)2I: Alterations strictly limited to addition of lighting controls.

2.6 Nonresidential Outdoor Lighting Controls Alterations

Section 141.0(b)2Lii: This section references Section 130.2, but the references have not been updated to reflect revisions to Section 130.2 that are proposed in the 15-Day Language. The Statewide CASE Team recommends that the Energy Commission review Section 141.0(b)2Lii and update the language as appropriate so the requirements for alterations remain unchanged from the 2016 standards even though the language in Section 130.2 has been revised.

2.7 Nonresidential Wattage Calculation

Section 130.0(c)2 is ambiguous and could more clearly state what is the deemed wattage of luminaires with line voltage lamp holders. The Statewide CASE Team proposes that the Energy Commission review and update the language. Specifically, the proposed 2019 code does not clearly explain the relationship between part A and B. It is unclear whether luminaire wattage is the maximum rated wattage of the luminaire, 50 watts per socket (for luminaires with screw base sockets), or the rated wattage of installed JA8 lamps. The Statewide CASE Team proposes that the Energy Commission clarify the relationship between parts A and B. The 15-Day Language as proposed by the Energy Commission is as follows:

2. For luminaires with line voltage lamp holders not containing permanently installed ballasts or transformers, the wattage of such luminaires shall be determined as follows:
 - A. The maximum rated wattage of the luminaire;
 - B. For recessed luminaires with line-voltage medium screw base sockets, wattage shall not be less than 50 watts per socket, or the rated wattage of the installed JA8 compliant lamps.

2.8 Residential Lighting Standards

Section 150.0(k)1Cvi: Reference to the "JA8" label has been removed and replaced with language that references marking requirements in Joint Appendix 8 (JA8). The 2016 Title 24 Residential Standards allowed designers, contractors, and inspectors to focus on a single metric as it applies to light emitting diode lighting: the "JA8" marking. The Statewide CASE Team believes references to the JA8 marking should be reinserted into this section to simplify compliance.

C. Recessed Downlight Luminaires in Ceilings. In addition to complying with 150.0(k)1A, luminaires recessed into ceilings shall meet all of the following requirements:

- i. Be listed, as defined in Section 100.1, for zero clearance insulation contact (IC) by Underwriters Laboratories or other nationally recognized testing/rating laboratory; and
- ii. Have a label that certifies the luminaire is airtight with air leakage less than 2.0 CFM at 75 Pascals when tested in accordance with ASTM E283. An exhaust fan housing shall not be required to be certified airtight; and
- iii. Be sealed with a gasket or caulk between the luminaire housing and ceiling, and ~~shall~~ have all air leak paths between conditioned and unconditioned spaces sealed with a gasket or caulk; and
- iv. For luminaires with hardwired ballasts or drivers, allow ballast or driver maintenance and replacement to be readily accessible to building occupants from below the ceiling without requiring the cutting of holes in the ceiling; and
- v. Shall not contain screw base sockets, ~~and~~ and
- ~~vi.~~ Shall contain light sources that comply with References Joint Appendix JA8, including the elevated temperature requirements, and that are marked "JA8 2016 E" as specified in Reference Joint Appendix JA8.

vi. Shall contain light sources that comply with Reference Joint Appendix JA8, including the elevated temperature requirements, and that are marked “JA8-2019-E” as specified in Reference Joint Appendix JA8.

Section 150.0(k)1G: Language was stricken that requires screw based luminaires to be marked with “JA8-2016-E”. The Statewide CASE Team believes the intent of the language is to ensure screw based luminaires are labeled with the JA8 marking to make it easier for implementers of the residential Title 24 Standards to follow code. If this is the intent of the language, then the Statewide CASE Team proposes that the JA8 marking requirement be added back to the language. Proposed changes to language:

G. Screw based luminaires. Screw based luminaires shall ~~meet all of the following requirements:~~

- i. ~~The luminaires shall not be recessed downlight luminaires in ceilings; and~~
- ii. ~~The luminaires shall contain lamps that comply with Reference Joint Appendix JA8; and~~
- iii. ~~The installed lamps shall be marked with “JA8-2016” or “JA8-2016-E” as specified in Reference Joint Appendix JA8, and be marked with “JA8-2019” or “JA8-2019-E”.~~

EXCEPTION to Section 150.0(k)1G: Luminaires with hard-wired ballasts for high intensity discharge lamps.

Section 150.0(k)1H: The Statewide CASE Team believes the Energy Commission rewrote this section for simplification. However, we believe that the language can be further clarified by stating directly that light sources installed in enclosed or recessed luminaires need to be marked with “JA8-2019-E”. The Energy Commission’s proposed language implies that the implementers of the residential Title 24 Standards need to familiarize themselves with the elevated temperature and marking requirements in JA8. Ceiling recessed luminaires are already covered by Section 150.0(k)1C.

The intent of the 2016 Title 24 Standard was to ensure that JA8 light sources are appropriate for enclosed and recessed sources by requiring the “JA8-2019-E” markings, indicating elevated temperature testing had been completed. The 2016 code language included a confusing double negative. For clarity, we suggest using language similar to Section 150.0(k)1C. Proposed changes to language:

H. Light Sources in Enclosed or Recessed Luminaires. Enclosed luminaires or recessed luminaires that are not ceiling recessed luminaires, shall contain lamps and other separable light sources that are not compliant with the JA8 elevated temperature requirements and are marked “JA8-2019-E”. ~~including marking requirements, “JA8-2016-E” shall not be installed in enclosed or recessed luminaires.~~

If it is desired to allow legacy light sources in these luminaires, then the following could be added.

Exception to Section 150.0(k)1H: Enclosed luminaires or recessed luminaires that are not ceiling recessed luminaires containing light sources listed as items 1-6 in the first column of table 150.0-A.

Table 150.0-A: The Statewide CASE Team recommends the following changes to Table 150.0-A to clarify what designers and building official should be looking for, namely the “JA8-2019” marking on all LED lamps and SSL luminaires. It also highlights that “JA8-2019-E” is suitable for enclosed and recessed luminaires.

Table 1: Recommended changes to Table 150.0A

<p>High Efficacy Light Sources</p> <p>Luminaires installed with only the lighting technologies in this table shall be classified as high efficacy Light sources shall comply with one of the columns below:</p>
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<p>Light sources in this column other than those installed in ceiling recessed downlight luminaires are classified as high efficacy and are not required to comply with Reference Joint Appendix JA8</p>	<p>Light sources in this column shall be are only considered to be <u>high efficacy if they are certified to the Energy Commission as High Efficacy Light Sources in accordance with Reference Joint Appendix JA8 and be marked "JA8-2019" or "JA8-2019-E" (suitable for enclosed or recessed luminaires) as meeting required by JA8.</u></p>
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