

The Lighting Quotient

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California Energy Commission

DOCKETED**15-BSTD-01**

TN # 75433

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March 17, 2015

Sent via Email

CALIFORNIA ENERGY COMMISSION

Attention: Docket No. 15-BSTD-01

Dockets Office

1516 Ninth Street, MS-4

Sacramento, CA 95814

Dear Sirs,

In regard to the 2016 Building Energy Efficiency Standards proposed by the California Energy Commission, we respectfully request that the Commission consider the following and provide a written response in each instance.

SECTION 130.5(d) –Circuit Controls for 120-Volt Receptacles

45-day language: ***Circuit Controls for 120-Volt Receptacles.*** *In all buildings, both controlled and uncontrolled 120 volt receptacles shall be provided in each private office, open office area, reception lobby, conference room, kitchenette in office spaces, and copy room...*

During the Public Hearing for Nonresidential measures on Tuesday March 3, 2015, it was stated that the intent of the proposed updates to the Standards is to “stay in line with ASHRAE.” Notably, ANSI/ASHRAE/IES Standard 90.1-2010 Section 8.4.2 requires that 50% of all receptacles in private offices, open offices, and computer classrooms shall be controlled by an automatic control device. In comparison, current and proposed Title 24 Section 130.5(d) language does not include a receptacle control requirement for computer classrooms. Accordingly, we ask:

Has the Commission determined that imposing a receptacle control requirement to computer classrooms presents an unnecessary or unjustified “hardship?”

Furthermore, with the understanding that this Section is ultimately intended to implement “receptacle control” as opposed to “circuit control,” we respectfully propose that the word “circuit” be deleted from the first paragraph of Section 130.5(d) as follows:

“Controls for 120-Volt Receptacles. In all buildings, both controlled and uncontrolled 120 volt receptacles shall be provided in each private office, open office area,...”

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SECTION 130.5(d)1

45-day language: “*Electric circuits serving controlled receptacles shall be equipped with an occupant sensing control, automatic time-switch control, or other control capable of automatically shutting OFF the controlled receptacles when the space is typically unoccupied...*”

Again, with the understanding that this Section is ultimately intended to implement “receptacle control” as opposed to “circuit control,” we respectfully propose the following revised language for Section 130.5(d)1:

“An occupant sensing control, automatic time-switch control, or other control shall be installed to automatically shut OFF the controlled receptacles when the space is typically unoccupied...”

SECTION 130.5(d)2

45-day language: “*At least one controlled receptacle shall be installed within 6 feet from each uncontrolled receptacle or a splitwired duplex receptacle with one controlled and one uncontrolled receptacle shall be installed...*”

The “50%” requirement specified in ANSI/ASHRAE/IES Standard 90.1-2010 Section 8.4.2 assures that, in regulated spaces, at least one controlled receptacle is provided in addition to EACH uncontrolled receptacle installed, while the Title 24 language does not. Title 24 Section 130.5(d)2 simply requires that “*At least one controlled receptacle shall be installed within 6 feet from each uncontrolled receptacle...*” Consider the respectively compliant receptacle arrangements shown in Figures 1-4, attached.

Also, as shown in Fig. 3 and Fig. 4, neither standard assures access to both controlled and uncontrolled receptacles at each workstation in open offices. Providing such access is desirable for limiting after-hours energy consumption. It should also be noted that “splitwired duplex receptacles” are generally not available for modular wiring systems deployed in open office workstations. Accordingly, the Commission may consider adding one of the following provisions:

“Where receptacles are installed at workstations in open office areas, at least one controlled receptacle shall be installed at each workstation.”

or,

“Where receptacles are installed at workstations in open office areas, at least one controlled and one uncontrolled receptacle shall be installed at each workstation.”

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SECTION 130.5(d)3

45-day language: “*Controlled receptacles shall have a permanent marking to differentiate them from uncontrolled receptacles...*”

Notably, ANSI/ASHRAE/IES Standard 90.1-2010 does not require that controlled receptacles be marked and perhaps is relying on a building code/electrical code to impose a marking requirement. For example, the 2014 edition of the National Electrical Code (NFPA 70) introduced subdivision 406.3(E) that reads as follows:

(E) Controlled Receptacle Marking. All noninterlocking type, 125-volt, 15- and 20-ampere receptacles that are controlled by an automatic control device, or that incorporate control features that remove power from the outlet for the purposes of energy management or building automation, shall be marked with the symbol shown in Figure 406.3(E) and located on the controlled receptacle outlet where visible after installation.”

The referenced figure is shown here:



Figure 406.3(E) Controlled Receptacle Marking Symbol.

70-281

Considering that California Title 24 Part 3 (California Electrical Code) is currently based on the 2011 National Electric Code which does not contain this language, it may be appropriate that Title 24 Part 6 Section 103.5(d)3 provide for the marking of controlled receptacles. However, one must question the need for such markings to be “permanent” and whether permanent markings are advisable and/or practical in all situations. To this question, it is notable that the NFPA’s instructional website refers to NEC Subsection 406(E) as “*a new field marking requirement*” (see www.necconnect.org/article406/). Furthermore, the NFPA has been asked if it might “allow these receptacles to be marked with text for both retrofit work and new work when specially marked receptacles are not available and the electrician does not have stickers with the designated icon and lacks artistic skills.” This query further supports the notion that the NEC requirement speaks to the marking of controlled receptacles in the field.

On renovation projects where existing modular workstations are reconfigured and circuit control is added for compliance, it may be an unwarranted burden to discard as many as half of the existing modular furniture receptacles and replace them with new permanently marked receptacles from the furniture system manufacturer. Moreover, it is questionable whether corresponding and compliantly marked system components are, or will be, available. Modular workstation plug load receptacles are broadly system specific, and any one system may already consist of numerous marked variants based on the system

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configuration (3+1, 2+2, 3SN, 3+3, etc.), grounding type (system or isolated), receptacle rating (15A or 20A), circuit number (1, 2, 3, 4, etc. or A, B, C, X, etc.), and/or receptacle color (black, gray, orange, etc.). It may not be practical to require each manufacturer to provide a second version of each variant with a permanent marking for use on controlled power circuits. Accordingly, we ask:

Does the Commission intend that each furniture system manufacturer shall offer marked and unmarked versions of every receptacle variant they offer?

Similarly, when projects with permanently marked controlled system furniture receptacles are reconfigured, the quantities and/or types of marked receptacles required for the new arrangement will likely differ from that of the previous arrangement; although, admittedly, the need for new receptacles and the number of discarded units will certainly be less/fewer than in the earlier case. Nevertheless:

In consideration of the above, and in the interest of establishing an environment of ongoing compliance, we respectfully recommend that the Commission consider deleting the word “permanent” from SECTION 130.5(d)3.

SECTION 130.5(d)8

45-day language: *“For open office areas, controlled circuits shall be provided and marked to support installation and configuration of office furniture with receptacles that comply with Section 130.5(d) 1, 2, 3, 4, 5, 6 and 7.”*

This requirement, along with EXCEPTION 1 to Section 130.5(d) discussed below, fails to acknowledge and anticipate receptacle circuit control technologies available in conjunction with the modular wiring systems supplied with open office workstation furniture. These **“furniture circuit control devices”** facilitate compliance by eliminating the need for building controlled circuits in open office areas. Furniture circuit control devices may be integrated into the furniture system modular power feed cable (as shown in Figures 7, 8, and 9, attached) or may be hardwired in-line between the furniture system and the building wiring (as shown in Figures 5 and 6, attached). Typically, they control workstation integrated receptacle circuits in response to one or more of the following control inputs:

- a. occupant sensing controls installed at each workstation
- b. wired or wireless transmissions from one or more occupant sensing room controls
- c. signals from one or more circuit status transmitter(s) associated with a reference circuit or a reference load that is ON when the space is occupied and OFF when the space is unoccupied
- d. a building energy management system

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The Commission would do well to consider an exception to Section 130.5(d)8 for furniture circuit switching devices supplied integral to modular office workstation systems. Accordingly, the Commission may consider adding the following language:

"EXCEPTION 1 to Section 130.5(d)8: In open office areas, controlled circuits are not required if, at time of final permit, workstations are installed and equipped with integral circuit control devices that provide receptacles that comply with Section 130.5(d) 1, 2, 3, 4, 5, 6 and 7."

EXCEPTION 1 to Section 130.5(d)

45-day language: *"In open office areas, controlled circuit receptacles are not required if, at time of final permit, workstations are installed, and each workstation is equipped with an occupant sensing control that is permanently mounted in each workstation, and which controls a hardwired power strip..."*

As positioned, this exception relieves open office areas from the need to provide "at least one controlled receptacle...within 6 feet from each uncontrolled receptacle" per Section 130.5(d)2 and relieves open office areas from the need to mark controlled receptacles per Section 130.5(d)3 altogether when a hardwired power strip is provided and connected to occupant sensing controls permanently mounted in each workstation. While we assume the intent of this exception is to provide a controlled power strip at each workstation, the current language could also refer to a single power strip controlled by sensors located at numerous workstations. Moreover, this exception may result in controlled and uncontrolled hardwired receptacles that are undistinguishable. Therefore, we suggest that this exception be revised as follows and repositioned as an exception to Section 130.5(d)8 only, or omitted entirely:

"In open office areas, controlled circuit receptacles are not required if, at time of final permit, workstations are installed, and each workstation is equipped with a hardwired power strip controlled by an occupant sensing control that is permanently mounted in the workstation."

If, on the other hand, this exception is intended in some way to relate a "hardwired power strip" to the modular wiring systems commonly provided with office workstation furniture, we suggest deleting this exception in consideration of the proposed exception to Section 130.5(d)8 above.

SECTION 140.6(a)2

45-day language: ***"Reduction of wattage through controls.*** *In calculating actual indoor Lighting Power Density, the installed watts of a luminaire providing general lighting in an area listed in TABLE 140.6-A may be reduced by the product of (i) the number of watts controlled as described in TABLE 140.6-A, times (ii) the applicable Power Adjustment Factor (PAF), if all of the following conditions are met...*

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- C. *The controlled lighting is permanently installed general lighting systems and the controls are permanently installed nonresidential-rated lighting controls. When used for determining PAFs for general lighting in offices, furniture mounted luminaires that comply with all of the following conditions shall qualify as permanently installed general lighting systems:*
- i. *The furniture mounted luminaires shall be permanently installed no later than the time of building permit inspection; and*
 - ii. *The furniture mounted luminaires shall be permanently hardwired; and*
 - iii. *The furniture mounted lighting system shall be designed to provide indirect general lighting; and*
 - iv. *Before multiplying the installed watts of the furniture mounted luminaire by the applicable PAF, 0.3 watts per square foot of the area illuminated by the furniture mounted luminaires shall be subtracted from installed watts of the furniture mounted luminaires; and*
 - v. *The lighting control for the furniture mounted luminaire complies with all other applicable requirements in Section 140.*"

In recent years, portable furniture mounted lighting systems have proven to be highly effective in reducing office lighting power density and lighting power consumption while delivering superior visual comfort and desirable workspace luminance ratios unattainable by most building mounted lighting systems. Moreover, the portability of these systems is crucial to preserving the cost benefits and sustainability aspects that modular office furniture systems bring to today's dynamic workplace. Imposing hardwiring requirements on modular office furniture systems negates the intrinsic value of portable systems furniture. Moreover, portable luminaires are now available that wirelessly integrate with room level and building level control systems to deliver the advanced functionality defined in Table 140.6-A, namely, Daylight Dimming Plus OFF Control, Occupancy Sensing in Large Open Plan Spaces, Institutional Tuning, and Demand Responsive Control, in addition to baseline compliance.

Thus, it follows that limiting the use of PAF's to *permanently* installed and *hardwired* furniture mounted general lighting systems and luminaires discourages consideration of a leading energy saving alternative. While the Commission has been proactive in recognizing the key role that portable lighting plays in strategically allocating and reducing building energy consumption (Exception to Section 140.6(a) exempts up to 0.3 watts per square foot of portable lighting in office areas from the calculation of indoor Lighting Power Density), and as the USGBC LEED rating system has come to acknowledge "flexible power distribution systems" and "flexible plug and play lighting controls" as sustainable technologies, we respectfully submit that the current language of Section 140.6(a)2C is unnecessarily limiting, if not counterproductive.

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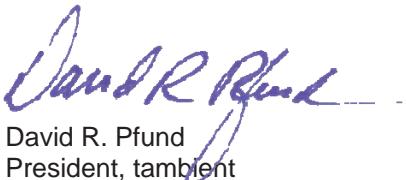
Respectfully, we propose the following revised language for Section 140.6(a)2C:

- "C. The luminaires and controls are installed no later than the time of building permit inspection and the controls installed are nonresidential-rated lighting controls. When used for determining PAFs for general lighting in offices, furniture mounted luminaires that comply with all of the following conditions shall qualify:**
- i. The furniture mounted lighting system shall be designed to provide indirect general lighting; and**
 - ii. Before multiplying the installed watts of the furniture mounted luminaire by the applicable PAF, 0.3 watts per square foot of the area illuminated by the furniture mounted luminaires shall be subtracted from installed watts of the furniture mounted luminaires; and**
 - i. The lighting control for the furniture mounted luminaire complies with all other applicable requirements in Section 140."**

This language also rectifies a conflict between the Exception to Section 140.6(a) and Section 140.6(a)2C.iv wherein the current exception to Section 140.6(a) refers to *portable* office lighting, and Section 140.6(a)2C.iv suggest "*multiplying the installed watts of [some of these portable luminaires] by the applicable PAF.*"

In consideration of the above, please let us know if you have any questions or require any additional information. We look forward to receiving your response.

Sincerely,



David R. Pfund
President, tambient

Enclosure

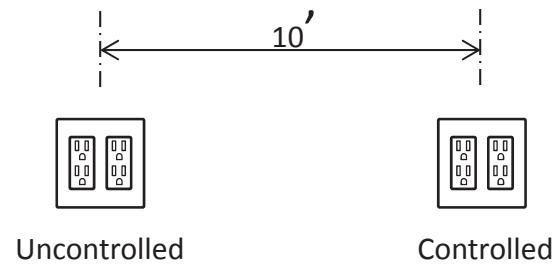
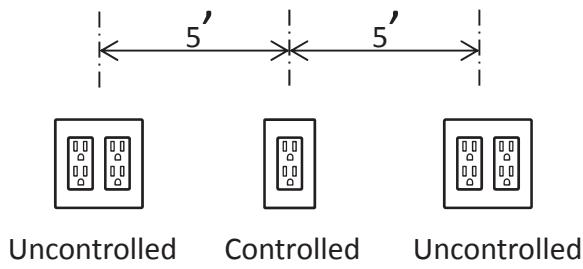


Figure 1

Title 24 Compliant

of uncontrolled receptacles = 8
of controlled receptacles = 2

Figure 2

ASHRAE 90.1-2010 Compliant

of uncontrolled receptacles = 4
of controlled receptacles = 4

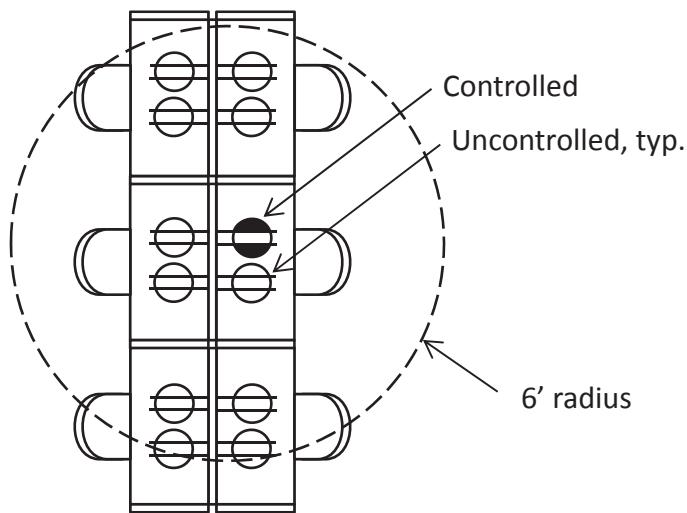


Figure 3

Title 24 Compliant

of uncontrolled receptacles = 22
of controlled receptacles = 2

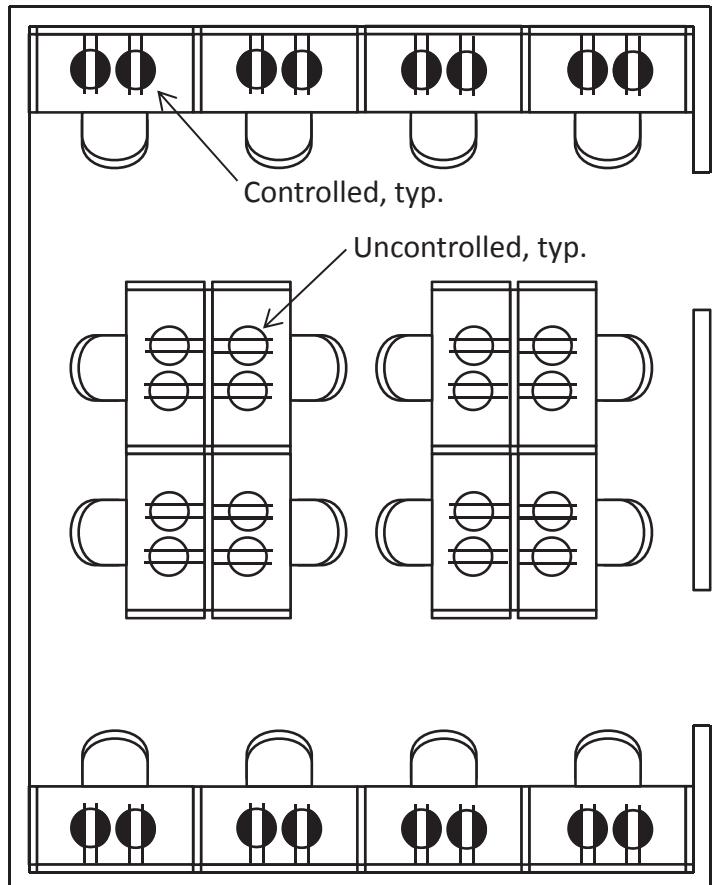


Figure 4

ASHRAE 90.1-2010 Compliant

of uncontrolled receptacles = 20
of controlled receptacles = 20

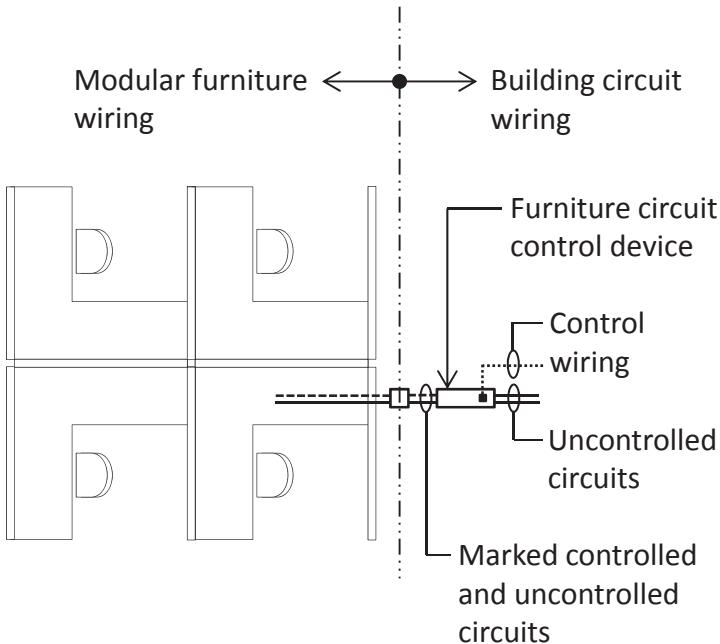


Figure 5
Complies with Section 130.5(d)8

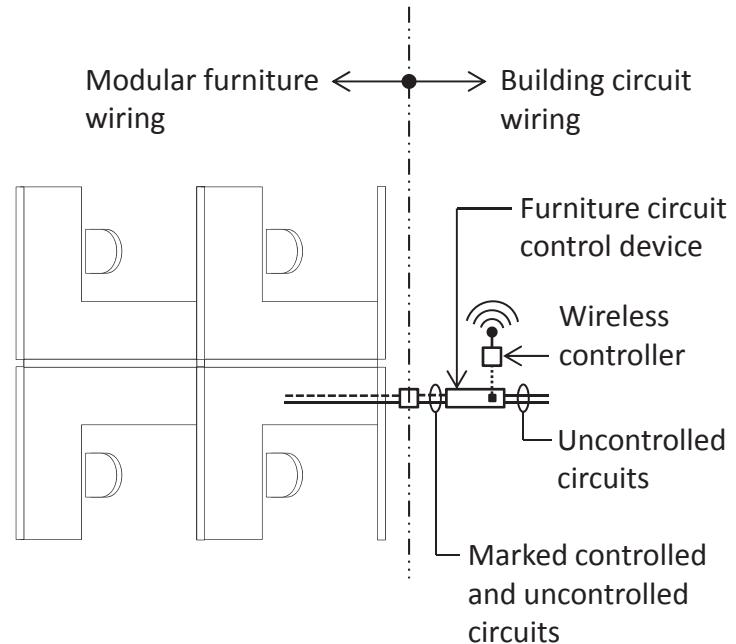


Figure 6
Complies with Section 130.5(d)8

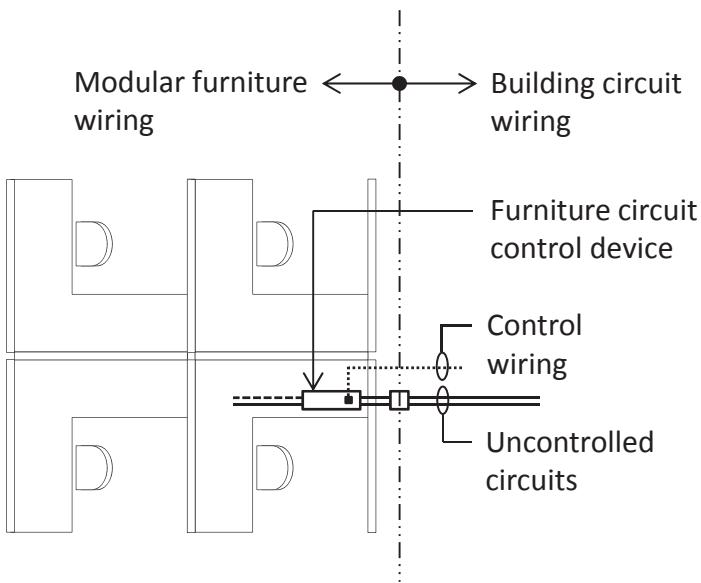


Figure 7
Complies with proposed
Exception to Section 130.5(d)8

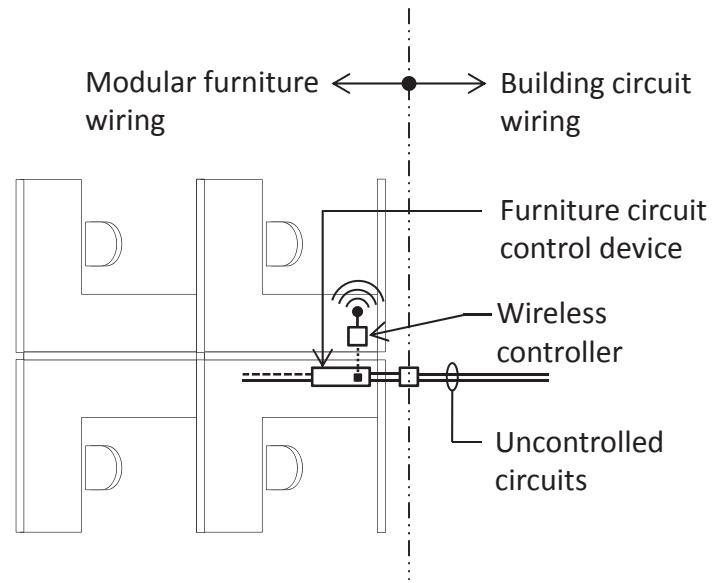


Figure 8
Complies with proposed
Exception to Section 130.5(d)8

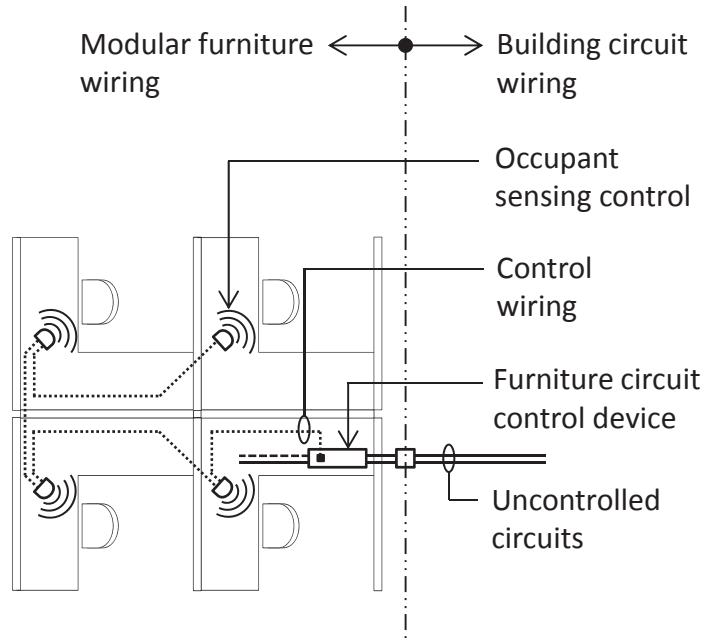


Figure 9
Complies with proposed
Exception to Section 130.5(d)8