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## Clarification of compliance with Section 130.5(b) (Separation of Electrical Circuits for Electrical Energy Monitoring)

There was confusion in the market as to whether a single panelboard that serves multiple load types with each circuit serving only one load type could be used to comply with Section 130.5(b) of the code. A clarification was issued in the October â€“ December 2017 (Issue 121) BluePrint saying â€œthe system can be designed so that one panel contains multiple load types. Each branch circuit serves a single load type.â€ Our comments (shown in red in the attached document) simply aligns the Compliance Manual with this clarification.

*Additional submitted attachment is included below.*

## 8.2 Service Electrical Metering Requirements

§130.5(a)

Projects are required to provide an electrical metering system that measures the instantaneous power usage and the cumulative electrical energy being used by the building. For metering systems that are not provided by the serving utility company, requirements apply based on the service kVA as specified in Table 130.5-A and stated below:

• For electrical service rated at any kVA, the meter must be able to indicate instantaneous kW demand and KWh for a user-defined period.

• For electrical service rated more than 250 kVA, the meter must be able to measure historical peak demand in kilowatts.

• For electrical services rated more than 1000kVA, the meter must also be able to measure historical peak demand in kilowatts and kWh per rate period.

Utility-provided meters that indicate instantaneous kW demand and kWh for a utility-defined period are sufficient to meet this Section's requirements, and are not required to measure historical peak demand. If the utility-provided meter does not indicate instantaneous kW demand and kWh for a utility-defined period, then a separate meter must also be installed that provides the full functionality required by § 130.5(a) and Table 130.5-A of the Energy Standards.

Each electrical service or feeder must have a permanently installed metering system that complies with these requirements. The terms "service" and "feeder" are both defined in regulation, the first in the Energy Standards and the latter in the California Electrical Code, as follows:

• "Service is the conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premise served", as defined in §100.1 of the Energy Standards.



• "Feeder - All circuit conductors between the service equipment, the source of a separately derived system, or other power supply source and the final branch-circuit overcurrent device", as defined in Article 100 of the 2016 California Electrical Code.

This is not a requirement to install meters both at the service and at each feeder. Rather, this requirement simply prevents unmetered service or feeder circuits from being installed within a building by requiring that a meter be installed at either the service level or, if not at the service level, at the feeder level, whatever is appropriate for the installation in question.

- For 2019 Standards, installations subject to Article 517 of California Electrical Code are exempted from the requirement of Section 130.5(a), Service Electrical Metering. Healthcare facilities overseen by the California Office of Statewide Health Planning and Development (OSHPD) are brought into the scope of Title 24 Part 6 for the first time, the purpose of this exemption is to avoid potentially conflicting requirements for healthcare facilities. This exception may be revisited for changes in future code cycles.

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**Example 8-1**

**Question:**

There is one service to my building and the building fire pump is installed with the power connection tapped to the same service.

Do I need to install another meter for the fire pump, in addition to the service metering already provided by the local utility?

**Answer:**

No, it is not mandatory to provide another meter for the fire pump if it is using a service that is already connected to a meter. If it is not using a service that is already metered, then a separate meter may be required.

**Example 8-2**

**Question:**

There are two services provided by the local utility company to my building.

Do both services require meeting the service electrical metering requirement?

**Answer:**

Yes, it is mandatory to have one service electrical metering for each service in accordance with §130.5(a).

**Example 8-3**

**Question:**

I own a nonresidential building with four tenant units. The building has one service and there are four sets of meters and disconnect switches, one set for each tenant unit. The meters are provided by a local utility company, they provide the required kW and kWh information, and I intend to utilize the meters to meet the §130.5(a) requirement. Is this allowed by the regulations?

**Answer:**

Yes, metering each feeder instead of metering the service is allowed, and is intended to address situations where one service feeds to multiple tenants.

**Example 8-4**

**Question:**

I have a building with multiple tenant spaces and each individual tenant space is served by separate and individual feeders. There is an individual meter for each feeder. Do I have to install a separate meter at the building service to fulfill the §130.5(a) requirement?

**Answer:**

No, it is not necessary to install a separate metering system for the service if a) there are individual meters for all the feeders and b) all the meters meet the metering functionality requirements, based on the building service size, in Table 130.5-A of the Energy Standards.



## 8.3 Separation of Electrical Circuits for Electrical Energy Monitoring

§130.5(b)

The purpose of the Separation of Electrical Circuits requirement is to set up a backbone for monitoring the specific contributions of separate loads to the overall energy use of the building. By designing the electrical distribution system with separation of electrical loads in mind, energy monitoring can be readily setup and implemented without significant physical changes to the electrical installations. The end goal is to be able to monitor the electrical energy usage of each load type specified in Table 130.5-B of the Energy Standards: building owners, facility management, and others can make use of such energy usage information to better understand how much energy has been used by each building system during a certain period of time.

Further analysis of such energy information can help facilitate energy efficiency measures to improve building energy performance for building owners and operators.

For 2019 Standards, installations subject to Article 517 of California Electrical Code are exempted from the requirement of Section 130.5(b), Separation of Electrical Circuits for Electrical Energy Monitoring. Healthcare facilities overseen by the California Office of Statewide Health Planning and Development (OSHPD) are brought into the scope of Title 24 Part 6 for the first time, the purpose of this exemption is to avoid potentially conflicting requirements for healthcare facilities.

**Example 8-5**

**Question:**

My new nonresidential building is served by a single panel with a service less than 50 kVA.

What is the required separation of electrical circuit requirement for this building?

**Answer:**

Since the service is smaller than 50 kVA, renewable power sources and electric vehicle charging stations shall be separated from other electrical load types and from each other, in accordance with the "Electrical Service rated 50kVA or less" column of Table 130.5-B and §130.5(b).

The renewable power source shall be separated by group. All electric charging vehicle loads can be in aggregate.

If there are no renewable power sources or electric vehicle charging stations in this building, it is not required to separate the electrical circuits for electrical energy monitoring purposes.

### 8.3.1 Compliance Methods

Electrical power distribution systems shall be designed so that measurement devices can monitor the electrical energy usage of load types according to Table 130.5-B. However, for each separate load type, up to 10 percent of the connected load may be of any other load type. Also, note that the 2016 requirements have moved to become more flexible than the 2013 requirements: where the 2013 Energy Standards prescribed specific methods for ensuring separation of electrical loads, the 2016 Energy Standards allow any approach that provides the ability to measure the separate loads of the building.

The separation of electrical circuit requirement of §130.5(b), may be accomplished by any of the following example methods:

**A. Method 1 (See Example 8-6):** Switchboards, motor control centers, or panelboards loads can be disaggregated for each load type, allowing their independent energy measurement.

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*2016 Nonresidential Compliance Manual January 2017*

This method must permit permanent measurement and determination of actual interval demand load value for each disaggregated load in the system.

This is a straightforward approach, as each distribution equipment serves a single load type. Summation of the kVA measurement of the distribution equipment in accordance with the respective load type can result in the energy usage of each load type. This method is simple and straightforward in terms of the effort required in compiling the measurement data.

**B. Method 2 (See Example 8-7):** Switchboards, motor control centers, or panelboards may supply other distribution equipment with their loads disaggregated for each load type. The measured interval demand load for each piece of distribution equipment must be able to be added or subtracted from other distribution equipment supplying them. This method must permit permanent measurement and determination of actual interval demand load value for each disaggregated load in the system.

This method allows distribution equipment to serve more than one load type while still allowing the separate energy use of each load to be determined. More effort may be required in terms of treatment of the measured energy data in order to obtain the energy usage of each load type.

**C. Method 3 (See Example 8-8):** Switchboards, motor control centers or panelboards may supply more than one load type as long as each branch circuit serves a single load type and the equipment includes provisions for adding branch circuit monitoring in the future. There is no requirement to include branch circuit monitoring at this time.

For example, neighboring branch circuits in a panelboard may serve receptacles and fans, respectively, but a single circuit cannot serve both of these load types.

~~C.~~ D **Method ~~3~~ 4:** Buildings for which a complete metering and measurement system is provided that at a minimum, measures and reports the loads by type.

This method allows a complete metering system to be used to meet the requirements of §130.5(b), provided that at a minimum measures and reports the loads called for in Table 130.5-B of the Energy Standards. Such an installation goes beyond the requirement of the Energy Standards as it meters and measures the power and energy usage of each load type.

**Example 8-6**

**Question:**

I am working on a new building project of a nonresidential building with a service less than 250 kVA but more than 50kVA. Following is the proposed concept layout of separation of circuits for connecting different load types to the service equipment. Does this meet the requirements of the Energy Standards?

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**Answer:**

The proposed design meets the separation of electrical circuit requirement of §130.5(b) as there are separations of circuits for connecting different load types to the service equipment. There should be provisions including physical spaces for future setup of measurement devices for energy monitoring at each electrical installation location.

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**Example 8-7**

**Question:**

Part of my proposed design is to use a distribution panel serving HVAC loads, with the panel also feeding a lighting panelboard. There is another, separate panelboard serving plug loads only.

Does this design meet the requirements of the Energy Standards?

**Answer:**

The proposed design meets the separation of electrical circuit requirement of §130.5(b) as each load type of load in the building can be accounted for by addition and subtraction of the measured energy data as indicated in Method 2.

**Example 8-8**

**Question:**

Can a panelboard with provisions allowing branch circuit energy monitoring be used to meet the separation of electrical circuits requirement? Each circuit would serve no more than one load type. Does this design meet the requirements of the Energy Standards?

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**Answer:**

The proposed design allows each load type to be separately measured for energy usage, and therefore meets the requirements of §130.5(b).

**8.3.2 Application Considerations**

The Energy Standards envision the use of conventional panelboards, motor control centers, panelboards, and other standard wiring methods for meeting the requirement to separate electrical loads. The requirement may also be achieved by a well-planned wiring approach, such as connecting all HVAC units to a single feeder from the service using a combination of through feeds and taps. The regulations are intentionally written to specify the "what" without prescribing the "how", and thus provide as much flexibility as possible.

In a "typical" small building with a service less than 50kVA, separation of electrical loads is not required at all. Slightly larger buildings are able to comply by using carefully laid-out panelboards.

In larger buildings, separate risers for lighting, receptacles/equipment, and HVAC are allowed to be used for meeting the separation of electrical circuits requirement. Single large loads or groups of loads, such as an elevator machine room, or a commercial kitchen, may be connected to panelboards or motor control centers served by a dedicated feeder and the electrical power and energy of the entire group of loads can be measured by metering the feeder.

For services rated more than 250 kVA, lighting and plug loads are required to be separated "*by floor, type or area*". So, in a single-story building, all the lighting loads could be fed from a single panel, and all the plug loads could be fed from another panel (or, alternatively, both types of loads could be fed from one panel with a ~~split bus~~ provision to allow future metering for each load type and segregating the load type data either in the panel or remote of the panel with software/mobile application).

Page 8-10 Electrical Power Distribution - Voltage Drop Requirements

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In a multi-story building, a simple way to comply would be to install a separate lighting panel and a separate plug-load panel for each floor of the building. However, it would be equally acceptable (and may be more useful) to divide the load according to which area of the building it serves (office, warehouse, corridors etc.), or by the type of light fixture (metal halide vs. fluorescent, dimmable vs. fixed output, etc.). So, for instance, both the first and second floor office lights could be fed from the same panel, while the warehouse lights would be fed from a second panel. Dividing the load by area or by type instead of by floor is more likely to yield useful information when the loads are analyzed in an energy audit. All of these approaches are available to designers and installers, and are acceptable methods of complying with the Energy Standards.