

New Section 135 Requirements for Electrical Distribution Systems

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Purpose

The proposed measure is to require provisions in a building's electrical distribution system that will ensure relatively easy implementation of advanced metering and control, including demand response and the "smart grid" .

Precedent

- ASHRAE/IES 90.1-2010
- ASHRAE/IES/USGBC 189.1-2009
- IECC-2009
- California Electrical Code 2010

Requirements

- (a) Addition of energy readouts to the metering of services. The requirements are progressive, with simple metering provisions up to 250kVA services and some logging capabilities for larger services.
- (b) Disaggregating the load types in an electrical system such that major load types can be easily measured at a single point. The actual measuring equipment is not required.
- (c) Feeders to have no greater than 2% voltage drop, and branch circuits to have not more than 3% voltage drop, as recommended by the California Electrical Code 2010.
- (d) Automatic shut off of about $\frac{1}{2}$ of all receptacles in offices and related spaces to save energy.
- (e) All buildings to be enabled to receive and act upon demand response signals.
- (f) Building automation systems allowed to provide required control functions of several sections.

Type of Change

- This change adds mandatory measures
- This change would slightly increase the scope or direction of the current Standards. This change would not require implementation of systems or equipment that are not already readily available on the market and for use in the proposed applications. Some of these systems are already regulated and included in the current Standards.
- The Standards and Manuals would be modified in order to include the new requirements. The change would require a new Section 135.

Energy Savings

- Parts (a), (b), (e) and (f) of this measure are not directly energy saving.
- Part (c) of the measure saves energy by ensuring that electrical feeders and circuit wiring are designed to minimize voltage drop. Voltage drop is wasted energy.
- Part (d) of the measure saves energy by shutting off receptacle circuits when a space is unoccupied.

Non-energy Benefits

Parts (a), (b), (e) and (f) of this measure require basic construction that will enable the addition of control and measurement technologies as their cost effectiveness improves and as the need for control and measurement becomes important due to demand response, time of use rates and other functions of the future “smart grid”.

Costs of Measures

- | | |
|------------------------------|--------------------------------|
| a. Metering requirements | a. None or almost none |
| b. Disaggregated wiring | b. Already good practice |
| c. Voltage drop requirements | c. Already good practice |
| d. Auto receptacle shutoff* | d. Adds \pm \$0.25 to .50/sf |
| e. DR provisions* | e. Insignificant cost |
| f. Use of BAS/EMS | f. Already good practice |

***Applicable CASE Reports from 4/4/2011 Workshop**

- DR for Lighting (HMG)
- DR for HVAC (LBNL)
- Task Lighting and Plug Control (HMG)

Cost Effectiveness of Receptacle Automatic Shut Off

- Demonstrated in http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/2011-04-04_workshop/review/Office_Task_Lighting_Plug_Load_Circuit_Control.pdf
- Rapid payback based on Office of the Future Phase 1 report findings

Notes about Receptacle Shutoff

- Requires hardwired shutoff circuits – not portable
 - EXCEPTION: a motion controlled plug strip is permitted if installed as part of a furniture system installation
- Receptacles to be marked
- Split receptacles allowed
- Only required for offices and related space types
- Exceptions for outlets for specific purpose
 - Network devices
 - Appliances

Summary

- Adds new requirements
- Increases scope
- Consistent with other energy codes and electrical codes
- Prepares buildings for the future at minimum cost

Questions?

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Part of the Architectural Energy Corp. Team supporting
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Development