



8. POWER

8.1 General

8.1.1 Scope. This section applies to all building power distribution systems and only to equipment described below.

8.1.2 New Buildings. Equipment installed in new buildings shall comply with the requirements of this section.

8.1.3 Addition to Existing Buildings. Equipment installed in addition to existing buildings shall comply with the requirements of this section.

8.1.4 Alterations to Existing Buildings

Exception: Compliance shall not be required for the relocation or reuse of existing equipment at the same site.

8.1.4.1 Alterations to building service equipment or systems shall comply with the requirements of this section applicable to those specific portions of the building and its systems that are being altered.

8.1.4.2 Any new equipment subject to the requirements of this section that is installed in conjunction with the alterations as a direct replacement of existing equipment shall comply with the specific requirements applicable to that equipment.

8.2 Compliance Paths

8.2.1 Compliance. Power distribution systems in all projects shall comply with the requirements of Section 8.1, “General”; Section 8.4, “Mandatory Provisions”; and Section 8.7, “Submittals.”

8.3 Simplified/Small Building Option (Not Used)

8.4 Mandatory Provisions

8.4.1 Voltage Drop

Exception: Feeder conductors and branch circuits that are dedicated to emergency services

8.4.1.1 Feeders. Feeder conductors shall be sized for a maximum voltage drop of 2% at design load.

8.4.1.2 Branch Circuits. Branch circuit conductors shall be sized for a maximum voltage drop of 3% at design load.

8.4.2 Automatic Receptacle Control. The following shall be automatically controlled:

- a. At least 50% of all 125-volt 15- and 20-amp receptacles in all private offices, conference rooms, rooms used primarily for printing and/or copying functions, break rooms, classrooms, and individual workstations
- b. At least 25% of branch circuit feeders installed for modular furniture not shown on the construction documents

This control shall function on

- a. a scheduled basis using a time-of-day operated control device that turns receptacles off at specific programmed times—an independent program schedule shall be provided for controlled areas of no more than 5000 ft² and not more than one floor (the occupant shall be able to manually override the control device for up to two hours),
- b. an occupant sensor that shall turn receptacles off within 20 minutes of all occupants leaving a space, or
- c. an automated signal from another control or alarm system that shall turn receptacles off within 20 minutes after determining that the area is unoccupied.

All controlled receptacles shall be permanently marked to visually differentiate them from uncontrolled receptacles and are to be uniformly distributed throughout the space.

Plug-in devices shall not be used to comply with Section 8.4.2.

Exceptions: Receptacles for the following shall not require an automatic control device:

1. Receptacles specifically designated for equipment requiring continuous operation (24 hours/day, 365 days/year)
2. Spaces where an automatic control would endanger the safety or security of the room or building occupant(s).

8.4.3 Electrical Energy Monitoring

8.4.3.1 Monitoring. Measurement devices shall be installed in new buildings to monitor the electrical energy use for each of the following separately:

- a. Total electrical energy
- b. HVAC systems
- c. Interior lighting
- d. Exterior lighting
- e. Receptacle circuits

For buildings with tenants, these systems shall be separately monitored for the total building and (excluding shared systems) for each individual tenant.

Exception: Up to 10% of the load for each of the categories (b) through (e) shall be allowed to be from other electrical loads.

8.4.3.2 Recording and Reporting. The electrical energy usage for all loads specified in Section 8.4.3.1 shall be recorded a minimum of every 15 minutes and reported at least hourly, daily, monthly, and annually. The data for each tenant space shall be made available to that tenant. The system shall

TABLE 8.4.4 Minimum Nominal Efficiency Levels for 10 CFR 431 Low-Voltage Dry-Type Distribution Transformers^a

Single-Phase Transformers		Three-Phase Transformers	
kVA ^b	Efficiency,% ^c	kVA ^b	Efficiency,% ^c
15	97.7	15	97.0
25	98.0	30	97.5
37.5	98.2	45	97.7
50	98.3	75	98.0
75	98.5	112.5	98.2
100	98.6	150	98.3
167	98.7	225	98.5
250	98.8	300	98.6
333	98.9	500	98.7
		750	98.8
		1000	98.9

a. A low-voltage distribution transformer is a transformer that is air-cooled, does not use oil as a coolant, has an input voltage ≤ 600 V, and is rated for operation at a frequency of 60 Hz.

b. kilovolt-ampere rating.

c. Nominal efficiencies shall be established in accordance with the 10 CFR 431 test procedure for low-voltage dry-type transformers.

be capable of maintaining all data collected for a minimum of 36 months.

Exceptions to 8.4.3.1 and 8.4.3.2:

1. Building less than 25,000 ft²
2. Individual tenant spaces less than 10,000 ft²
3. Dwelling units
4. Residential buildings with less than 10,000 ft² of common area
5. Critical and Equipment branches of NEC Article 517

8.4.4 Low-Voltage Dry-Type Distribution Transformers. Low-voltage dry-type transformers shall comply with the provisions of the Energy Policy Act of 2005, where applicable, as shown in Table 8.4.4. Transformers that are not included in the scope of the Energy Policy Act of 2005 have no performance requirements in this section and are listed for ease of reference as exceptions.

Exceptions: Transformers that meet any of the following exclusions of the Energy Policy Act of 2005 based on 10 CFR 431 definition:

1. Special purpose applications
2. Not likely to be used in general purpose applications
3. Transformers with multiple voltage taps where the highest tap is at least 20% more than the lowest tap
4. Drive transformer
5. Rectifier transformer
6. Auto-transformer
7. Uninterruptible power system transformer
8. Impedance transformer
9. Regulating transformer
10. Sealed and nonventilating transformer
11. Machine tool transformer
12. Welding transformer
13. Grounding transformer, or

14. Testing transformer

8.5 Prescriptive Path (Not Used)

8.6 Alternative Compliance Path (Not Used)

8.7 Submittals

8.7.1 Drawings. Construction documents shall require that within 30 days after the date of system acceptance, record drawings of the actual installation shall be provided to the building owner, including

- a. a single-line diagram of the building electrical distribution system and
- b. floor plans indicating location and area served for all distribution.

8.7.2 Manuals. Construction documents shall require that an operating manual and maintenance manual be provided to the building owner. The manuals shall include, at a minimum, the following:

- a. Submittal data stating equipment rating and selected options for each piece of equipment requiring maintenance.
- b. Operation manuals and maintenance manuals for each piece of equipment requiring maintenance. Required routine maintenance actions shall be clearly identified.
- c. Names and addresses of at least one qualified service agency.
- d. A complete narrative of how each system is intended to operate.

(Enforcement agencies should only check to ensure that the construction documents require this information to be transmitted to the owner and should not expect copies of any of the materials.)

8.8 Product Information (Not Used)