OHSPD 3 - Clinics

2013 CEC Article 517
Health Care Facilities

Del Kirkish, P.E.
(916) 440-8391
Del.Kirkish@oshpd.ca.gov

Part I - General (definitions)*

- **Patient Care Area**
  - **Where patients are intended to be examined or treated.**
  - **General Care Area**
    - **Patient beds, exam rooms, treatment rooms, etc., where patients will come in contact with ordinary appliances.**
  - **Critical Care Area**
    - **Operating rooms, post- operative recovery rooms, and similar areas in which patients are intended to be subjected to invasive procedures and connected to line-operated, electromedical devices.**
- **Patient Care Vicinity**
  - **the space with surfaces likely to be contacted by the patient or attendant, typically within 6 feet from perimeter of bed and 7.5 feet above the floor.**
- **Electrical life-support equipment**
  - **Electrically powered equipment whose continuous operation is necessary to maintain a patient's life.**
  - ***CEC: 517.2**

Part II - Wiring and Protection

- **Grounding of receptacles and fixed equipment in Patient Care Areas**
  - **Metal raceway system or cable having metallic armor or sheath assembly and qualify as an equipment grounding conductor in accordance with 250.118 [517.13(A)]**
  - **Insulated copper grounding conductor connected to ground terminals of all receptacles, metal junction boxes and fixed equipment. [517.13(B)]**

- **Panels serving same patient care vicinity shall have equipment grounding terminal buses connected [517.14]**

- **Wet procedure locations shall be provided with either GFCI or isolated power for receptacles and fixed equipment. [CEC 517.20]**

Part II - Wiring and Protection (Continued)

- **At each General Care bed location:**
  - **Minimum of four receptacles (hospital grade type) [517.18 (B)]**
  - **Clinics, except for Ambulatory Surgical Clinics, are not required to have two branch circuits (normal and emergency [except 517.18 (A)]**
  - **No multi-wire branch circuits serving bed locations [517.18 (A)]**

- **At each Critical Care Area bed location:**
  - **Two branch circuits (normal and emergency) [517.19 (A)]**
  - **No multi-wire branch circuits serving bed locations [517.19 (A)]**
  - **Emergency circuit shall supply outlets only at that bed location (dedicated) [517.19 (A)]**
  - **Emergency receptacles shall indicate the panel and circuit number feeding them. [517.19 (A)]**
  - **Minimum of six receptacles (hospital grade type) [517.19 (B)]**

Part III - Essential Electrical System

- **Hospitals**
  - **CEC 517.30 – CEC 517.35**
- **Nursing Homes and Limited Care Facilities**
  - **CEC 517.40 – CEC 517.44**
- **Other Health Care Facilities**
  - **CEC 517.45**

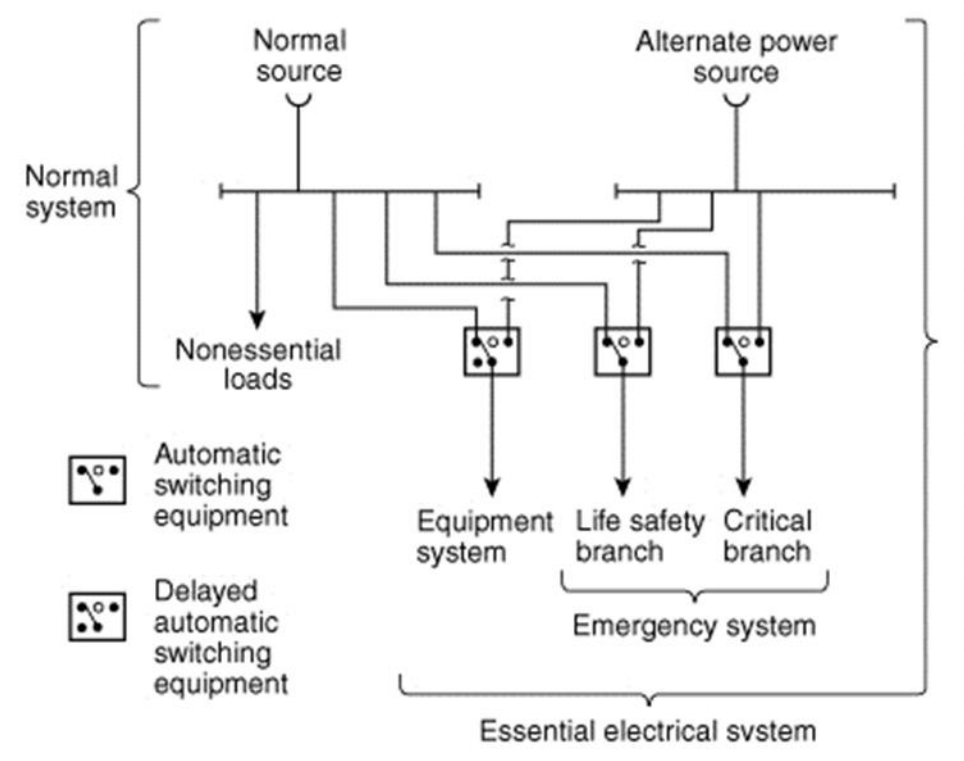
Section 517.45 - Essential Electrical Systems for Other Health Care Facilities

- (A)The Essential Electrical System shall be a battery or generator system
- (B) Where electrical life support equipment is required, the essential electrical distribution system shall be as described in 517.30 through 517.35 … i.e ventilators
- (C) Where critical care areas are present, the essential electrical distribution system shall be as described in 517.30 through 517.35
- (D.1, F) Ambulatory Surgical Clinics shall be provided with a generator with on-site fuel and the essential electrical distribution system shall be as described in 517.30 through 517.35
- (G) Hemodialysis Clinics require illumination for means of egress and exit lights using battery-operated equipment with a capacity to sustain its connected load for a minimum of 1 ½ hours after loss of the normal source."

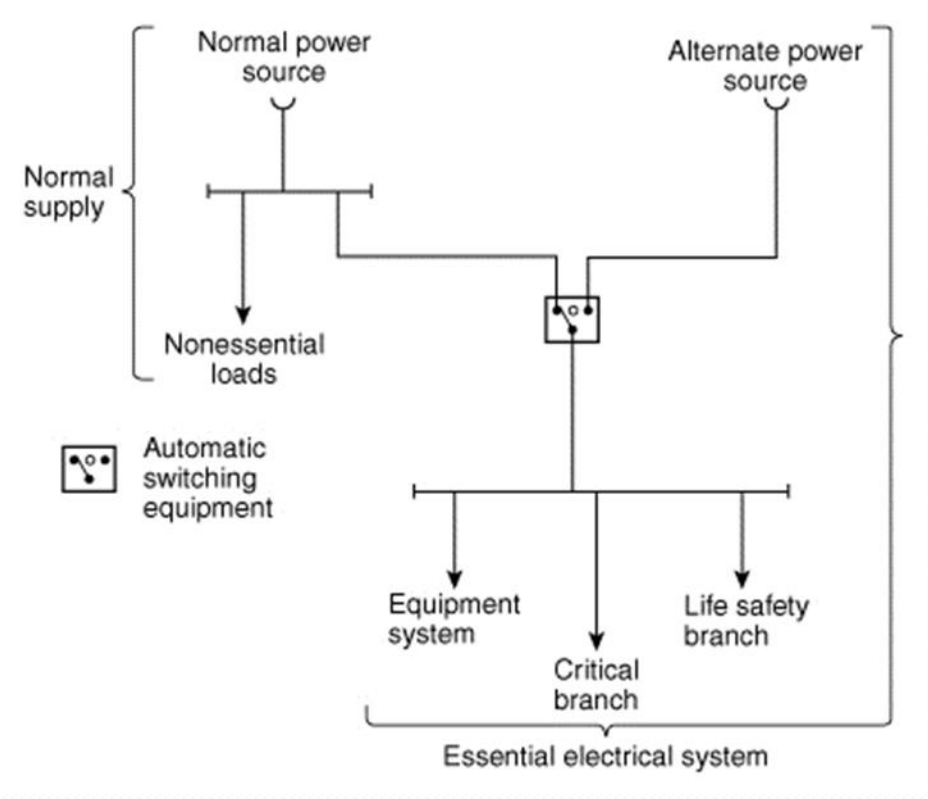
Essential Electrical System as described in 517.30 through 517.35

- **Separation of the essential electrical loads[517.30(C)(1)]**
  - **Emergency System**
    - **Life Safety Branch**
    - **Critical Branch**
  - **Equipment System**
- **Three transfer switches (minimum) for generator loads greater than 150 KVA**
- **One transfer switch (minimum) for generator loads up to 150 KVA**
- **Automatic transfer switches for Ambulatory Surgical Clinics shall have electrically bypass and isolation and an in-phase monitor relay. [CEC 517.30(B)(7)]**

Three Transfer Switches for Loads Greater than 150KVA [Figure 517.30 No.1]



One Transfer Switch for Loads up to 150KVA [Figure 517.30 No.1]



Life Safety Branch, Critical Branch and Equipment System

- **Life Safety Branch [517.32]**
  - **Ensure safety to patients and personnel**
  - **Only functions listed in 517.32 can be connected to Life Safety Branch including egress lighting, exit signs, fire alarms, medical gas alarms, and generator lighting and accessories.**
- **Critical Branch [517.33]**
  - **Task illumination, fixed equipment, selected receptacles, and special power circuits serving areas and functions related to patient care.**
- **Equipment System [517.34]**
  - **Serves primarily 3-phase power equipment**
  - **Includes vacuum pumps, medical air, HVAC as required by the CMC, etc.**

Requirements for Emergency Generator

- **Comply with generator requirements required by the California Building Code [C.E.C., NFPA 110*, NPFA 37**]**
  - **Shall have adequate capacity to meet the demand for the operation of all functions and equipment to be served by each system and branch after loss of the normal power source [CEC 517.30(D.1)]**
  - **Fuel supply shall be sufficient for not less than 4 hours full-demand operation [CEC 700.12 (B)(2) Exception No. 3]**
  - **Shall be automatically connected to the life safety branch and critical branch loads within 10 seconds [CEC 517.31]**
  - **Battery-powered light and maintenance receptacle near generator set connected to the Life Safety Branch [517.32(E)]**
  - **Generator set accessories connect to Life Safety Branch [CEC 517.32(F)]**
  - **Generator shall not be located in a room or area used for any other purpose other than equipment and controls related to the generation and distribution of emergency power. [CBC 432.2.3]**
  - **Remote alarm annunciator at manned location [NFPA 99]**
  - **Emergency shut down [NFPA 37]**
  - ***CBC 2702.1 **CBC 432.1**

ANNUNCIATOR*

FUNCTION	LOCAL	REMOTE	SHUTDOWN
(a) Over-crank	X	X	X
(b) Low water temperature	X	X	
(c) High engine temperature pre-alarm	X	X	
(d) High engine temperature	X	X	X
(e) Low lube oil pressure	X	X	X
(f) Over-speed	X	X	X
(g) Low fuel main tank	X	X	
(h) Low coolant level	X	X	O
(i) EPS supplying load	X		
(j) Control switch in auto position	X	X	
(k) High battery voltage	X		
(l) Low cranking voltage	X	X	
(m) Low voltage in battery	X		
(n) Battery charger AC failure	X		
(o) Lamp test	X		
(p) Contacts for local & remote alarm	X	X	
(q) Audible alarm silencing switch		X	
(r) Remote emergency stop			X

*NFPA 110: Table 5.6.5.2 Safety Indications and Shutdowns, Level 1

Emergency System Wiring Requirements of Sections 517.30

- **Wiring of Life Safety and Critical Branch circuits shall be kept independent of other circuits and with each other. [517.30(C)(1)]**
- **Wiring of emergency circuits shall be mechanically protected; i.e., in nonflexible metal raceways, Type MI cable, Sched 80 PVC, Sched 40 with 2 inches of concrete (Nonmetallic not allowed in patient care areas.) [517.30(C)(3)]**
- **All receptacles and light switches on emergency power "*shall have a distinctive color or marking so as to be readily identified*." [517.30 (E)]**

- **Part IV - <u>Inhalation Anesthetizing Locations</u>:**
  - **All sections apply including:**
    - **517.63 (A): "One or more battery-powered lighting units shall be provided in accordance with Section 700-12(F)."**

- **Part V - <u>X-Ray Installations</u>:**
  - **All sections apply if imaging equipment in project.**

Part VI - Section 517.123 Signal Systems

- Location of Nurse Call Devices per Table 1224.4.6.5 of the California Building Code
- Nurse Call System shall meet UL 1069
- Bath Station in patient toilets with corresponding dome light over door. [517.123 (C)]
- Staff Emergency Station in O.R.'s and procedure rooms [CBC TABLE 1224.4.6.5]
- Patient station at each patient bed equipped for two-way voice communication with corresponding dome light on the corridor side of the patient room door. [CEC 517.123(B)]
- Smoke detectors shall be installed in patient sleeping rooms. Actuation shall cause a visual display on the corridor side of the room and an audible and visual alarm at the nurse station. [CFC 907.6.2.2]

CBC Section 1226 – Table 1224.4.6.5

TABLE 1224.4.6.5
[OSHPD 1, 2, 3 & 4] LOCATION OF NURSE CALL DEVICES
KEY: · Required

AREA DESIGNATION	PATIENT STATION	BATH STATION	STAFF EMERGENCY STATION	CODE CALL STATION	NURSE MASTER STATION	DUTY STATION	NOTE
Nursing Units							
Inpatient bed location	•	•					*1, 2, 3, 4*
Patient toilets, showers, and baths		•					*2*
Nurse/control station					•		
Clean workroom						•	
Soiled workroom						•	
Medication preparation room						•	
Examination/treatment room			•			•	
Staff lounge						•	
Other Clinical Areas							
Operating and cesarean delivery rooms			•				*2*
Procedure rooms			•				*2*
LDR/LDRP rooms	•		•	•			*1, 2, 3, 4*
Recovery—PACU			•	•			*2, 4*
Emergency exam, treatment, triage rooms	•		•	•			*1, 2, 4*
Patient preparation and holding areas	•		•				*1, 2*
Critical care bed locations, including NICU	•		•	•			*1, 2, 4, 5*
Newborn and special care nurseries			•				
Cardiac catheterization, interventional radiology, angiography			•	•			
MRI, CT, stress testing areas			•	•			*2, 4*
Psychiatric seclusion ante/exam rooms			•				

Notes:

1. *One device shall be permitted to accommodate both patient station and emergency staff assistance station functionality.*
2. *A visible signal shall be activated in the corridor at the patient's door, at the nurse/control station, and at all duty stations. In multicorridor nursing units, additional visible signals shall be installed at corridor intersections.*
3. *Two-way voice communication shall be provided with the nurse/control station.*
4. *One device shall be permitted to accommodate both emergency staff assistance and code call station functionality.*
5. *A patient station shall not be required in the NICU.*

CEC 210.8(B)

Ground-Fault Circuit-Interrupter Protection for Personnel Other Than Dwelling Units

210.8 Ground-Fault Circuit-Interrupter Protection for Personnel. Ground-fault circuit-interruption for personnel shall be provided as required in 210.8(A) through (C). The ground-fault circuit-interrupter shall be installed in a readily accessible location.

....

(B) Other Than Dwelling Units. All 125-volt, single-phase,15- and 20-ampere receptacles installed in the locations specified in 2 I0.8(B)(l) through (8) shall have ground-fault circuit-interrupter protection for personnel.

(1) Bathrooms

(2) Kitchens

(3) Rooftops

(4) Outdoors

(5) Sinks - where receptacles are installed within 1.8 m (6ft) of the outside edge of the sink.

Exception No. 2 to (5): for receptacles located in ~~patient care areas~~ patient bed locations of general care or critical care areas of health care facilities other than those covered under 210.8 (B)(1), GFCI protection shall not be required.

(6) Indoor wet locations

(7) Locker rooms with associated showering facilities

(8) Garages, service bays, and similar areas where electrical diagnostic equipment, electrical hand tools, or table lighting equipment are to be used

Significance of Change to CEC 210.8(B)

- GFCI receptacles in a Health Care Facility are required in bathrooms, kitchens, rooftops, outdoors, sinks indoor wet locations, sinks, locker rooms with associated showering facilities, garages except:
  - receptacles near sinks in patient bed locations of general care or critical care areas are not required to have GFCI protection.
  - receptacles near a toilet and basin installed within the patient rooms in critical care areas are not required to have GFCI receptacles per CEC 517.21.
- Patient Bed Location is the location of a patient sleeping bed, or the bed or procedure table of a critical care area.
- Patient Care Area is any portion of a health care facility where patients are intended to be examined or treated.

CEC 517.13(B)

Insulated Equipment Grounding Conductor

2010 CEC

(B) Insulated Equipment Grounding Conductor. The grounding terminals of all receptacles and all non–current–carrying conductive surfaces of fixed electrical equipment likely to become energized that are subject to personal contact, operating at over 100 volts, shall be connected to an insulated copper equipment grounding conductor. The equipment grounding conductor shall be sized in accordance with Table 250.122 and installed in metal raceways or as a part of listed cables having a metallic armor or sheath assembly with the branch-circuit conductors supplying these receptacles or fixed equipment

2013 CEC

(B) Insulated Equipment Grounding Conductor.

(1) General. The following shall be directly connected to an insulated copper equipment grounding conductor that is installed with the branch circuit conductors in the wiring methods as provided in 517 .13 A .

(1) The grounding terminals of all receptacles

(2) Metal boxes and enclosures containing receptacles.

(3) All non-current-carrying conductive surfaces of fixed electrical equipment likely to become energized that are subject to personal contact operating at over 100 volts.

Exception: An insulated equipment bonding jumper that directly connects to the equipment grounding conductor is permitted to connect the box and receptacle(s) to the equipment grounding conductor.

(2) Sizing. Equipment grounding conductors and equipment bonding jumpers shall be sized in accordance with 250.122.

CEC 517.16

Receptacles with Insulated Grounding Terminals

2010 CEC

Receptacles with insulated grounding terminals, as permitted in 250.146(D), shall be identified; such identification shall be visible after installation

2013 CEC

Receptacles with insulated grounding terminals, as describe in 250.146(D), shall not be permitted.

(Note: California amendment for this Section will be deleted in future change)

CEC 517.17 (B)

Ground-Fault Protection - Feeders

(B) Feeders. Where ground-fault protection is provided for operation of the service disconnecting means or feeder disconnecting means as specified by 230.95 or 215.10, an additional step of ground-fault protection shall be provided in all next level feeder disconnecting means downstream toward the load. Such protection shall consist of overcurrent devices and current transformers or other equivalent protective equipment that shall cause the feeder disconnecting means to open.

The additional levels of ground-fault protection shall not be installed ~~as follows:1.~~ on the load side of an essential electrical system transfer switch.

~~2. Between the on-site generating unit(s) described in 517.35(B) and the essential electrical system transfer switch(es)~~

~~3. On electrical systems that are not solidly grounded wye systems with greater than 150 volts to ground but not exceeding 600 volts phase-to-phase~~

Significance of Change to CEC 517.17(B)

- Negligible
- Allows addition level of ground-fault protection to be installed on between generator and transfer switch(es) or on other electrical systems not required in CEC 230.95 and 215.10.
  - Note: Essential electrical system is not required to have ground fault protection per CEC 700.26 .
  - Note: Ground-fault protection is only require on 480V solidly grounded wye electric services and feeders with disconnect rated 1000 amps or more per CEC 230.95 and 215.10.

CEC 517.17 (C)

Ground-Fault Protection - Selectivity

2010 CEC

C. Selectivity. Ground-fault protection for operation of the service and feeder disconnecting means shall be fully selective such that the feeder device, but not the service device, shall open on ground faults on the load side of the feeder device. A six-cycle minimum separation between the service and feeder ground-fault tripping bands shall be provided. Operating time of the disconnecting devices shall be considered in selecting the time spread between these two bands to achieve 100 percent selectivity.

2013 CEC

(C) Selectivity. Ground-fault protection for operation of the service and feeder disconnecting means shall be fully selective such that the feeder device, but not the service device, shall open on ground faults on the load side of the feeder device. Separation of ground-fault protection time-current characteristics shall conform to manufacturer's recommendations and shall consider all required tolerances and disconnect operating rating time to achieve 100 percent selectivity.

Significance of Change to CEC 517.17(C)

- Deletes the six-cycle minimum separation between the service and feeder ground-fault tripping bands.
- Selective is still required but needs to conform to manufacturers recommendations and needs to achieve 100% selectivity.

CEC 517.18(A) and CEC 517.19(A)

Patient Bed Location Branch Circuits

New Requirement

- The branch circuit serving patient bed locations shall not be part of a multi-wire branch circuit.

CEC 517.18(B) and CEC 517.19(B)(2)

Patient Bed Location Receptacles

- Quadruplex receptacles added to list of acceptable receptacle types for patient bed locations.

517.20(A)

Wet Procedure Locations - Receptacles and Fixed Equipment

2010 CEC

(A) Receptacles and Fixed Equipment. All receptacles and fixed equipment within the area of the wet procedure location shall have ground-fault circuit-interrupter protection for personnel if interruption of power under fault conditions can be tolerated, or be served by an isolated power system if such interruption cannot be tolerated.

2013 CEC

(A) **Receptacles and Fixed Equipment**. Wet procedure location patient care areas shall be provided with special protection against electric shock by one of the following means:

(1) Power distribution system that inherently limits the possible ground-fault current due to a first fault to a low value, without interrupting the power supply

(2) Power distribution system in which the power supply is interrupted if the ground-fault current does, in fact, exceed a value of 6 mA

Significance of Change to 517.20(A)

- Revised language.
- 517.20(A)(1) is an isolated power system, in most cases.
- 517.20(A)(2) is a GFCI.

CEC 517.30(C)(1)

Wiring Requirements – Separation from Other Circuits

New Requirements

- Where general care locations are served from two separate transfer switches on the emergency system in accordance with 517.18(A), Exception No. 3, the general care circuits from the two separate systems shall be kept independent of each other.
- Where critical care locations are served from two separate transfer switches on the emergency system in accordance with 5 17.19(A), Exception No. 2, the critical care circuits from the two separate systems shall be kept independent of each other.

Thank you