



**National Fire Protection Association**

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## **WORKING DRAFT OF CODE-MAKING PANEL MEETING OUTPUT**

**CONTENT NOT FINAL –SUBJECT TO REVISION  
PRIOR TO LETTER BALLOT AND PUBLICATION OF  
FIRST DRAFT REPORT**

**Document: National Electrical Code®**

**Revision Cycle: A2019**

**Meeting Date: January 8 – 20, 2018**

**Committee Activity: Input Stage**

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This is a working draft, prepared by NFPA staff, to record the output generated at the Code-Making Panel's First Draft Meetings. It includes draft copies of the First Revisions and any Global Revisions.

It is being made available to Committee members for the purpose of facilitating early review, particularly for those Committee members who may be seeking input from their respective organizations in preparation for the Letter Ballot of the Committee.



## First Revision No. 8652-NFPA 70-2018 [ Definition: Invasive Procedure. ]

### **[517.2] Invasive Procedure.**

Any procedure that penetrates the protective surfaces of a patient's body (i.e., skin, mucous membrane, cornea) and that is performed with an aseptic field (procedural site). Not included in this category are placement of peripheral intravenous needles or catheters used to administer fluids and/or medications, gastrointestinal endoscopies (i.e., sigmoidoscopies), insertion of urethral catheters, and other similar procedures. [99:3.3.84 87 ]

### Submitter Information Verification

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submission Date:** Thu Jan 18 09:06:27 EST 2018

Make Editorial Changes  
Based on Committee  
Text

### Committee Statement and Meeting Notes

**Committee Statement:** All definitions in 517.2 should appear in alphabetical order as per NEC Style Manual 2.2.2. The extract was updated.

**Response Message:**

#### Committee Notes:

<u>Date</u>	<u>Submitted By</u>	
Jan 18, 2018	NEC-CMP Panel 15	This revision is created only to re-order the definition alphabetically..

Public Input No. 269-NFPA 70-2017 [Definition: Invasive Procedure.]



## First Revision No. 8656-NFPA 70-2018 [ Definition: Medical Office (Dental Office).

]

### [517.2] ~~Medical Office~~ **(Dental Office)** .

A building or part thereof in which the following occur:

- (1) examinations and minor treatments ~~or /~~ procedures are performed under the continuous supervision of a medical ~~or dental~~ professional;
- (2) ~~only sedation or local anesthesia is involved~~ the use of limited to minimal sedation and treatment or procedures that do not render the patient incapable of self-preservation under emergency conditions; and
- (3) no overnight stays for patients or 24-hour ~~operation are not provided~~ operations .

[99:3.3.98 106 ]

### Submitter Information Verification

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Thu Jan 18 09:17:59 EST 2018

Make Editorial Changes  
Based on Committee  
Text

### Committee Statement and Meeting Notes

**Committee Statement:** This revision updates the term to correlate with NFPA 99-2018. The definition of "Dental Office" is added separately.

**Response Message:**

Public Input No. 2098-NFPA 70-2017 [Definition: Medical Office (Dental Office).]

**First Revision No. 8818-NFPA 70-2018 [ Definition: Single-Pole Separable****Connector. ]****[530.2; MOVE TO 100] Single-Pole Separable Connector.**

A device that is installed at the ends of portable, flexible, single-conductor cable that is used to establish connection or disconnection between two cables or one cable and a single-pole, panel-mounted separable connector. (CMP-15)

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submittal Date:** Fri Jan 19 13:02:27 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** The definition of Single-Pole Separable Connector is being moved to Article 100 without change in the wording of the definition that currently appears in 530.2 This is because this device appears in the wording of more than one article.

CMP-15 believes that responsibility for this definition belongs with CMP-15.

**Response  
Message:**

Public Input No. 1459-NFPA 70-2017 [Definition: Single-Pole Separable Connector.]

Public Input No. 1456-NFPA 70-2017 [New Article after 100]

**First Revision No. 8655-NFPA 70-2018 [ Detail ]**

**Add a charging sentence to 517.2:**

**517.2 Definitions.** The definitions in this section shall apply only within this article.

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Thu Jan 18 09:15:32 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** This revision clarifies issues arising from the use of definitions in Article 100 and definitions used in Article 517.

**Response Message:**

Public Input No. 1901-NFPA 70-2017 [Section No. 517.2]

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SUBJECT TO REVISION - NOT FOR PUBLICATION

**First Revision No. 8810-NFPA 70-2018 [ Detail ]**

[517.42]

**(C) Capacity of System.** The essential electrical system shall have adequate capacity to meet the demand for the operation of all functions and equipment to be served by each branch at one time.

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Jan 19 12:40:12 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** The term "adequate" is in violation of the NEC Style Manual 3.2.1. The Code Making Panel has removed the term as it is an unenforceable or vague term.

**Response Message:**

**First Revision No. 8826-NFPA 70-2018 [ Detail ]**

520.2 Definitions. The definitions in this section shall apply only within this article.

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Jan 19 13:29:47 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** In order to increase clarity and readability, the panel accepts the recommendation of the Correlating Committee Task Group and adds wording to section 520.2.

**Response Message:**

Public Input No. 1902-NFPA 70-2017 [Section No. 520.2]

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SUBJECT TO REVISION - NOT FOR PUBLICATION



## First Revision No. 8838-NFPA 70-2018 [ Detail ]

522.2 Definitions. The definitions in this section shall apply only within this article.

### Submitter Information Verification

**Submitter Full Name:** NEC-CMP Panel 15  
**Organization:** [ Not Specified ]  
**Street Address:**  
**City:**  
**State:**  
**Zip:**  
**Submittal Date:** Fri Jan 19 13:58:02 EST 2018

### Committee Statement and Meeting Notes

**Committee Statement:** In order to increase clarity and readability, the panel accepts the recommendation of the Correlating Committee Task Group and adds wording to section 522.2 .

**Response Message:**

Public Input No. 1903-NFPA 70-2017 [Section No. 522.2]

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SUBJECT TO REVISION - NOT FOR PUBLICATION



**First Revision No. 8843-NFPA 70-2018 [ Detail ]**

525.2 Definitions. The definitions in this section shall apply only within this article.

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Jan 19 14:38:01 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** In order to increase clarity and readability, the panel accepts the recommendation of the Correlating Committee Task Group and adds wording to section 525.2.

**Response Message:**

Public Input No. 1905-NFPA 70-2017 [Section No. 525.2]

FOR CODE-MAKING PANEL USE ONLY  
SUBJECT TO REVISION - NOT FOR PUBLICATION

**First Revision No. 8848-NFPA 70-2018 [ Detail ]**

530.2 Definitions. The definitions in this section shall apply only within this article.

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Jan 19 14:56:43 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** In order to increase clarity and readability, the panel accepts the recommendation of the Correlating Committee Task Group on PI 1906 and adds wording to section 530.2.

**Response Message:**

Public Input No. 1906-NFPA 70-2017 [Section No. 530.2]

FOR CODE-MAKING PANEL USE ONLY  
SUBJECT TO REVISION - NOT FOR PUBLICATION

**First Revision No. 8857-NFPA 70-2018 [ Detail ]**

540.2 Definitions. The definitions in this section shall apply only within this article.

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Jan 19 15:12:13 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** In order to increase clarity and readability, the panel accepts the recommendation of the Correlating Committee Task Group and adds wording to section 540.2.

**Response Message:**

Public Input No. 1907-NFPA 70-2017 [Section No. 540.2]

FOR CODE-MAKING PANEL USE ONLY  
SUBJECT TO REVISION - NOT FOR PUBLICATION

**First Revision No. 8788-NFPA 70-2018 [ Global Input ]****Throughout Article 517:**

Change "other-than-hazardous (classified) locations" to "unclassified locations".

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submittal Date:** Fri Jan 19 10:02:13 EST 2018Make Editorial Changes  
Based on Committee  
Text**Committee Statement and Meeting Notes****Committee Statement:** This revision uses a defined term in Article 100 to remove vague and confusing language.**Response Message:**FOR CODE-MAKING PANEL USE ONLY  
SUBJECT TO REVISION - NOT FOR PUBLICATION



## First Revision No. 8795-NFPA 70-2018 [ Global Input ]

Throughout Article 517, update the NFPA 99 and NFPA 101 extracts in accordance with the attached file.

### Supplemental Information

<u>File Name</u>	<u>Description Approved</u>
70_FR8795_517.docx	✓

### Submitter Information Verification

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submission Date:** Fri Jan 19 10:59:40 EST 2018

Make Editorial Changes  
Based on Committee  
Text

### Committee Statement and Meeting Notes

**Committee Statement:** This revision updates the extracted text from NFPA 99 and NFPA 101.

The panel notes the publication date of NFPA 99 is later than the closing date of the NFPA 70 Public Input period. This disconnect makes the coordination of the two documents impossible during the public input period. The panel will work on key coordination issues during the interim period between the First Revision Stage and the Second Revision Stage.

In response to the Correlating Committee Public Comment 1813 in the 2017 cycle and in accordance with 4.3.3 of the NEC Style manual and 2.3.2.11 of the Manual of Style for NFPA Technical Committee Documents, permission was sought and obtained from HEA-FUN to use parenthetical references between specific older and current NFPA 99 terminology in the NEC as a transition. For 2020 NEC®, CMP 15 modifies the use of transitional terminology as follows: "Category 1 Space (Critical Care Space)", "Category 2 Space (General Care Space)", "Category 3 Space (Basic Care Space)", and "Category 3 Space (Support Space)".

**Response Message:**

**FR 8795, GLOBAL**

**REVISION: Revise Article 517 in accordance with the following:**

**Article 517 Health Care Facilities**

Informational Note: Text that is followed by a reference in brackets has been extracted from NFPA 99-~~2018-2015~~, *Health Care Facilities Code*, and NFPA 101-~~2018-2015~~, *Life Safety Code*. Only editorial changes were made to the extracted text to make it consistent with this *Code*.

**Part I. General**

**517.1 Scope.**

The provisions of this article shall apply to electrical construction and installation criteria in health care facilities that provide services to human beings.

The requirements in Parts II and III not only apply to single-function buildings but are also intended to be individually applied to their respective forms of occupancy within a multifunction building (e.g., a doctor's examining room located within a limited care facility would be required to meet the provisions of 517.10).

Informational Note: For information concerning performance, maintenance, and testing criteria, refer to the appropriate health care facilities documents.

**517.2 Definitions.**

**Alternate Power Source.** One or more generator sets, or battery systems where permitted, intended to provide power during the interruption of the normal electrical service; or the public utility electrical service intended to provide power during interruption of service normally provided by the generating facilities on the premises. [99:3.3.4]

**Ambulatory Health Care Occupancy.** An occupancy used to provide services or treatment simultaneously to four or more patients that provides, on an outpatient basis, one or more of the following:

- (1) Treatment for patients that renders the patients incapable of taking action for self-preservation under emergency conditions without assistance of others.
- (2) Anesthesia that renders the patients incapable of taking action for self-preservation under emergency conditions without the assistance of others.
- (3) ~~Emergency or urgent care Treatment~~ for patients who, due to the nature of their injury or illness, are incapable of taking action for self-preservation under emergency conditions without the assistance of others.

[~~101:3.3.188.13.3.196.1~~]

**Anesthetizing Location.** Any area of a facility that has been designated to be used for the administration of any flammable or nonflammable inhalation anesthetic agent in the course of examination or treatment, including the use of such agents for relative analgesia.

**Battery-Powered Lighting Units.** Individual unit equipment for backup illumination consisting of the following:

- (1) Rechargeable battery
- (2) Battery-charging means
- (3) Provisions for one or more lamps mounted on the equipment, or with terminals for remote lamps, or both
- (4) Relaying device arranged to energize the lamps automatically upon failure of the supply to the unit equipment

[~~99:3.3.15~~]

**Critical Branch.** A system of feeders and branch circuits supplying power for task illumination, fixed equipment, select receptacles, and select power circuits serving areas and functions related to patient care that are automatically connected to alternate power sources by one or more transfer switches during interruption of normal power source. [~~99:3.3.30-27~~]

**Dental Office.** A building or part thereof in which the following occur:

(1) examinations and minor treatments/procedures performed under the continuous supervision of a dental professional;

(2) use of limited to minimal sedation and treatment or procedures that do not render the patient incapable of self-preservation under emergency conditions; and

(3) no overnight stays for patients or 24-hour operations.

[99:3.3.38]

**Electrical Life-Support Equipment.** Electrically powered equipment whose continuous operation is necessary to maintain a patient's life.

[99:3.3.45-39]

**Equipment Branch.** A system of feeders and branch circuits arranged for delayed, automatic, or manual connection to the alternate power source and that serves primarily 3-phase power equipment. [99:3.3.49-43].

**Essential Electrical System.** A system comprised of alternate sources of power and all connected distribution systems and ancillary equipment, designed to ensure continuity of electrical power to designated areas and functions of a health care facility during disruption of normal power sources, and also to minimize disruption within the internal wiring system.

[99:3.3.51-45]

**Exposed Conductive Surfaces.** Those surfaces that are capable of carrying electric current and that are unprotected, uninsulated, unenclosed, or unguarded, permitting personal contact. [99:3.3.53-47]

Informational Note: Paint, anodizing, and similar coatings are not considered suitable insulation, unless they are listed for such use.

**Fault Hazard Current.** See *Hazard Current*.

**Flammable Anesthetics.** Gases or vapors, such as fluroxene, cyclopropane, divinyl ether, ethyl chloride, ethyl ether, and ethylene, which may form flammable or explosive mixtures with air, oxygen, or reducing gases such as nitrous oxide.

**Flammable Anesthetizing Location.** Any area of the facility that has been designated to be used for the administration of any flammable



inhalation anesthetic agents in the normal course of examination or treatment.

**Governing Body:**

~~The person or persons who have the overall legal responsibility for the operation of a health care facility. [99:3.3.62]~~

**Hazard Current.** For a given set of connections in an isolated power system, the total current that would flow through a low impedance if it were connected between either isolated conductor and ground. [99:3.3.70]

*Fault Hazard Current.* The hazard current of a given isolated system with all devices connected except the line isolation monitor. [99:3.3.70.1]

*Monitor Hazard Current.* The hazard current of the line isolation monitor alone. [99:3.3.70.2]

*Total Hazard Current.* The hazard current of a given isolated system with all devices, including the line isolation monitor, connected. [99:3.3.70.3]

**Health Care Facility's Governing Body.** ~~The person or persons who have the overall legal responsibility for the operation of a health care facility. [99:3.3.72]~~

**Health Care Facilities.** Buildings, portions of buildings, or mobile enclosures in which human medical, dental, psychiatric, nursing, obstetrical, or surgical care are provided. [99:3.3.71-67]

Informational Note: Examples of health care facilities include, but are not limited to, hospitals, nursing homes, limited care facilities, clinics, medical and dental offices, and ambulatory care centers, whether permanent or movable.

**Hospital.** A building or portion thereof used on a 24-hour basis for the medical, psychiatric, obstetrical, or surgical care of four or more inpatients. [~~101:3.3.142~~ 101:3.3.150]

**Isolated Power System.** A system comprising an isolating transformer or its equivalent, a line isolation monitor, and its ungrounded circuit conductors. [99:3.3.89-83]

**Isolation Transformer.** A transformer of the multiple-winding type, with the primary and secondary windings physically separated, that inductively couples its ungrounded secondary winding(s) to the grounded feeder system that energizes its primary winding(s). [99:3.3.90-84]

**Invasive Procedure.**

Any procedure that penetrates the protective surfaces of a patient's body (i.e., skin, mucous membrane, cornea) and that is performed with an aseptic field (procedural site). Not included in this category are placement of peripheral intravenous needles or catheters used to administer fluids and/or medications, gastrointestinal endoscopies (i.e., sigmoidoscopies), insertion of urethral catheters, and other similar procedures. [99:3.3.81]

Commented [CB1]: See FR 8652

**Life Safety Branch.** A system of feeders and branch circuits supplying power for lighting, receptacles, and equipment essential for life safety that is automatically connected to alternate power sources by one or more transfer switches during interruption of the normal power source. [99:3.3.93-87]

**Limited Care Facility.** A building or portion thereof used on a 24-hour basis for the housing of four or more persons who are incapable of self-preservation because of age; physical limitation due to accident or illness; or limitations such as mental retardation/developmental disability, mental illness, or chemical dependency.

**Line Isolation Monitor.** A test instrument designed to continually check the balanced and unbalanced impedance from each line of an isolated circuit to ground and equipped with a built-in test circuit to exercise the alarm without adding to the leakage current hazard. [99:3.3.95-89]

**Medical Office (Dental Office).** A building or part thereof in which the following occur: (1) examinations and minor treatments or procedures are performed under the continuous supervision of a medical or dental professional; (2) only sedation or local anesthesia is involved and treatment or procedures do not render the patient incapable of self-preservation under emergency conditions; and (3) overnight stays for patients or 24-hour operation are not provided. [99:3.3.98]

Commented [CB2]: See FR 8656

**Monitor Hazard Current.** See *Hazard Current*.

**Nurses' Stations.** Areas intended to provide a center of nursing activity for a group of nurses serving bed patients, where the patient calls are

received, nurses are dispatched, nurses' notes written, inpatient charts prepared, and medications prepared for distribution to patients. Where such activities are carried on in more than one location within a nursing unit, all such separate areas are considered a part of the nurses' station.

**Nursing Home.** A building or portion of a building used on a 24-hour basis for the housing and nursing care of four or more persons who, because of mental or physical incapacity, might be unable to provide for their own needs and safety without the assistance of another person.

[~~101:3.3.142.2~~ 101:3.3.148.2]

**Patient Bed Location.** The location of a patient sleeping bed, or the bed or procedure table of a Category 1 (critical care) space. [~~99:3.3.135-125~~]

**Patient Care Space.** Any space of a health care facility wherein patients are intended to be examined or treated. [~~99:3.3.136-127~~]

Informational Note No. 1: The health care facility's governing body of the facility designates patient care space in accordance with the type of patient care anticipated. [~~99:1.3.4.1~~]

Informational Note No. 2: Business offices, corridors, lounges, day rooms, dining rooms, or similar areas typically are not classified as patient care spaces. [~~99:A.3.3.136-127~~]

Category 1 (Critical Care) Space. Space in which failure of equipment or a system is likely to cause major injury or death of patients, staff, or visitors.

[~~99:3.3.136.1~~ ]

Informational Note: Category 1 (critical care) spaces, formerly known as critical care rooms [(spaces)], are typically where patients are intended to be subjected to invasive procedures and connected to line-operated, patient care-related appliances. Examples include, but are not limited to, special care patient rooms used for critical care, intensive care, and special care treatment rooms such as angiography laboratories, cardiac catheterization laboratories, delivery rooms, operating rooms, post-anesthesia care units, trauma rooms, and other similar rooms. [~~99:A.3.3.136.1~~]

Category 2 (General Care) Space. Space in which failure of equipment or a system is likely to cause minor injury to patients, staff, or visitors.

[~~99:3.3.136.2~~]

Informational Note: Category 2 (general care) spaces were formerly known as general care rooms [(spaces)]. Examples include, but are not limited to, inpatient

bedrooms, dialysis rooms, in vitro fertilization rooms, procedural rooms, and similar rooms. [99:A.3.3.136.2]

Category 3 (Basic Care) (Category 3) Space.

Space in which failure of equipment or a system is not likely to cause injury to the patients, staff, or visitors but can cause patient discomfort.

[99:3.3.136.3 127.3]

Informational Note: Category 3 (basic care). These spaces, formerly known as basic care rooms [(spaces)], are typically where basic medical or dental care, treatment, or examinations are performed. Examples include, but are not limited to, examination or treatment rooms in clinics, medical and dental offices, nursing homes, and limited care facilities. [99:A.3.3.136.3 127.3]

General Care (Category 2) Space.

Space in which failure of equipment or a system is likely to cause minor injury to patients, staff, or visitors. [99:3.3.136.2 127.2]

Informational Note: Category 2 (general care) spaces were formerly known as general care rooms [(spaces)]. Examples include, but are not limited to, inpatient bedrooms, dialysis rooms, in vitro fertilization rooms, procedural rooms, and similar rooms. [99:A.3.3.136.2 127.2]

Category 1 (Critical Care) (Category 1) Space. Space in which failure of equipment or a system is likely to cause major injury or death of patients, staff, or visitors. [99:3.3.136.1 127.1]

Informational Note: Category 1 (critical care) spaces, formerly known as critical care rooms [(spaces)], are typically where patients are intended to be subjected to invasive procedures and connected to line-operated, patient care-related appliances. Examples include, but are not limited to, special care patient rooms used for critical care, intensive care, and special care treatment rooms such as angiography laboratories, cardiac catheterization laboratories, delivery rooms, operating rooms, post-anesthesia care units, trauma rooms, and other similar rooms. [99:A.3.3.136.1 127.1]

Category 4 (Support) (Category 4) Space.

Space in which failure of equipment or a system is not likely to have a physical impact on patient care. [99:3.3.136.4 127.4]

Informational Note: Category 4 (support) spaces were formerly known as support rooms [(spaces)]. Examples of support spaces include, but are not limited to, anesthesia work rooms, sterile supply, laboratories, morgues, waiting rooms, utility rooms, and lounges. [99:A.3.3.136.4 127.4]

**Patient Care Vicinity.** A space, within a location intended for the examination and treatment of patients, extending 1.8 m (6 ft) beyond the normal location of the patient bed, chair, table, treadmill, or other device that supports the patient during examination and treatment and extending vertically to 2.3 m (7 ft 6 in.) above the floor. [99:3.3.139-128]

**Patient Equipment Grounding Point.** A jack or terminal that serves as the collection point for redundant grounding of electrical appliances serving a patient care vicinity or for grounding other items in order to eliminate electromagnetic interference problems. [99:3.3.140-129]

**Psychiatric Hospital.** A building used exclusively for the psychiatric care, on a 24-hour basis, of four or more inpatients.

**Reference Grounding Point.** The ground bus of the panelboard or isolated power system panel supplying the patient care room. [99:3.3.154-143]

**Relative Analgesia.** A state of sedation and partial block of pain perception produced in a patient by the inhalation of concentrations of nitrous oxide insufficient to produce loss of consciousness (conscious sedation).

**Selected Receptacles.** A minimum number of receptacles selected by the [health care facility's](#) governing body of a facility as necessary to provide essential patient care and facility services during loss of normal power. [99:3.3.160-148]

**Task Illumination.** Provisions for the minimum lighting required to carry out necessary tasks in the described areas, including safe access to supplies and equipment and access to exits. [99:63.3.173-164]

**Total Hazard Current.** The hazard current of a given isolated system with all devices, including the line isolation monitor, connected. [99:3.3.70-66-3]

**Wet Procedure Location.** The area in a patient care space where a procedure is performed that is normally subject to wet conditions while patients are present, including standing fluids on the floor or drenching of the work area, either of which condition is intimate to the patient or staff. [99:3.3.183-174]

Informational Note: Routine housekeeping procedures and incidental spillage of liquids do not define a wet procedure location. [99:A.3.3.183.474]

**X-Ray Installations, Long-Time Rating.** A rating based on an operating interval of 5 minutes or longer.

**X-Ray Installations, Mobile.** X-ray equipment mounted on a permanent base with wheels, casters, or a combination of both to facilitate moving the equipment while completely assembled.

**X-Ray Installations, Momentary Rating.** A rating based on an operating interval that does not exceed 5 seconds.

**X-Ray Installations, Portable.** X-ray equipment designed to be hand carried.

**X-Ray Installations, Transportable.** X-ray equipment to be conveyed by a vehicle or that is readily disassembled for transport by a vehicle.

## Part II. Wiring and Protection

### 517.10 Applicability.

#### (A) Applicability.

Part II shall apply to patient care space of all health care facilities.

#### (B) Not Covered.

Part II shall not apply to the following:

- (1) Business offices, corridors, waiting rooms, and the like in clinics, medical and dental offices, and outpatient facilities
- (2) Areas of nursing homes and limited care facilities wired in accordance with Chapters 1 through 4 of this *Code* where these areas are used exclusively as patient sleeping rooms

Informational Note: See NFPA 101-2015, *Life Safety Code*<sup>®</sup>.

Commented [CB3]: See FR 8662

### 517.11 General Installation — Construction Criteria.

The purpose of this article is to specify the installation criteria and wiring methods that minimize electrical hazards by the maintenance of adequately low potential differences only between exposed conductive surfaces that are likely to become energized and could be contacted by a patient.

Informational Note: In a health care facility, it is difficult to prevent the occurrence of a conductive or capacitive path from the patient's body to some grounded object, because that path may be established accidentally or through instrumentation directly connected to the patient. Other electrically conductive surfaces that may make an additional contact with the patient, or instruments that may be connected to the patient, then become possible sources of electric currents that can traverse the patient's body. The hazard is increased as more apparatus is associated with the patient, and, therefore, more intensive precautions are needed. Control of electric shock hazard requires the limitation of electric current that might flow in an electrical circuit involving the patient's body by raising the resistance of the conductive circuit that includes the patient, or by insulating exposed surfaces that might become energized, in addition to reducing the potential difference that can appear between exposed conductive surfaces in the patient care vicinity, or by combinations of these methods. A special problem is presented by the patient with an externalized direct conductive path to the heart muscle. The patient may be electrocuted at current levels so low that additional protection in the design of appliances, insulation of the catheter, and control of medical practice is required.

#### **517.12 Wiring Methods.**

Except as modified in this article, wiring methods shall comply with the applicable provisions of Chapters 1 through 4 of this Code.

Commented [CB4]: See FR 8700

#### **517.13 Grounding of Receptacles and Fixed Electrical Equipment in Patient Care Spaces.**

Wiring in patient care spaces shall comply with 517.13(A) and (B).

##### **(A) Wiring Methods.**

All branch circuits serving patient care spaces shall be provided with an effective ground-fault current path by installation in a metal raceway system or a cable having a metallic armor or sheath assembly. The metal raceway system, metallic cable armor, or sheath assembly shall itself qualify as an equipment grounding conductor in accordance with 250.118.

##### **(B) Insulated Equipment Grounding Conductors and Insulated Equipment Bonding Jumpers.**

###### **(1) General.**

The following shall be directly connected to an insulated copper equipment grounding conductor that is clearly identified along its entire length by green insulation and installed with the branch circuit conductors in the wiring methods as provided in 517.13(A):

- (1) The grounding terminals of all receptacles other than isolated ground receptacles

(2) Metal outlet boxes, metal device boxes, or metal enclosures

(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 No. 1: For other than isolated ground receptacles, 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. Isolated ground receptacles shall be connected in accordance with 517.16.*

*Exception No. 2: Metal faceplates shall be permitted to be connected to the equipment grounding conductor by means of a metal mounting screw(s) securing the faceplate to a grounded outlet box or grounded wiring device.*

*Exception No. 3: Luminaires more than 2.3 m (7½ ft) above the floor and switches located outside of the patient care vicinity shall be permitted to be connected to an equipment grounding return path complying with 517.13(A) or (B).*

## **(2) Sizing.**

Equipment grounding conductors and equipment bonding jumpers shall be sized in accordance with 250.122.

Commented [CB5]: See FR 8666

## **517.14 Panelboard Bonding.**

The equipment grounding terminal buses of the normal and essential branch-circuit panelboards serving the same individual patient care vicinity shall be connected together with an insulated continuous copper conductor not smaller than 10 AWG. Where two or more panelboards serving the same individual patient care vicinity are served from separate transfer switches on the essential electrical system, the equipment grounding terminal buses of those panelboards shall be connected together with an insulated continuous copper conductor not smaller than 10 AWG. This conductor shall be permitted to be broken in order to terminate on the equipment grounding terminal bus in each panelboard.

## **517.16 Use of Isolated Ground Receptacles.**

### **(A) Inside of a Patient Care Vicinity.**

An isolated grounding receptacle shall not be installed within a patient care vicinity. [99:6.3.2.2.7.1(B)]



**(B) Outside of a Patient Care Vicinity.**

Isolated ground receptacle(s) installed in patient care spaces outside of a patient care vicinity(s) shall comply with 517.16(B)(1) and (2).

**(1)**

The grounding terminals of isolated ground receptacles installed in branch circuits for patient care spaces shall be connected to an insulated equipment grounding conductor in accordance with 250.146(D) in addition to the equipment grounding conductor path required in 517.13(A). The equipment grounding conductor connected to the grounding terminals of isolated ground receptacles in patient care spaces shall be clearly identified along the equipment grounding conductor's entire length by green insulation with one or more yellow stripes.

**(2)**

The insulated grounding conductor required in 517.13(B)(1) shall be clearly identified along its entire length by green insulation, with no yellow stripes, and shall not be connected to the grounding terminals of isolated ground receptacles but shall be connected to the box or enclosure indicated in 517.13(B)(1)(2) and to non-current-carrying conductive surfaces of fixed electrical equipment indicated in 517.13(B)(1)(3).

Informational Note No. 1: This type of installation is typically used where a reduction of electrical noise (electromagnetic interference) is necessary, and parallel grounding paths are to be avoided.

Informational Note No. 2: Care should be taken in specifying a system containing isolated ground receptacles, because the grounding impedance is controlled only by the grounding wires and does not benefit from any conduit or building structure in parallel with the grounding path. [99:A.6.3.2.2.7.1]

Commented [CB6]: See FR 8670

**517.17 Ground-Fault Protection.**

**(A) Applicability.**

The requirements of 517.17 shall apply to hospitals, and other buildings (including multiple-occupancy buildings) with critical care (Category 1) spaces or utilizing electrical life-support equipment, and buildings that provide the required essential utilities or services for the operation of critical care (Category 1) spaces or electrical life-support equipment.

Commented [CB7]: See FR 8681

**(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 on the load side of an essential electrical system transfer switch.

Commented [CB8]: See FR 8701

### (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 time to achieve 100 percent selectivity.

Informational Note: See 230.95, informational note, for transfer of alternate source where ground-fault protection is applied.

### (D) Testing.

When equipment ground-fault protection is first installed, each level shall be performance tested to ensure compliance with 517.17(C).

Commented [CB9]: See FR 8685

## 517.18 Category 2 (General Care) ~~(Category 2)~~ Spaces.

### (A) Patient Bed Location.

Each patient bed location shall be supplied by at least two branch circuits, one from the critical branch and one from the normal system. All branch circuits from the normal system shall originate in the same panelboard. The electrical receptacles or the cover plate for the electrical receptacles supplied from the critical branch shall have a distinctive color or marking so as to be readily identifiable and shall also indicate the panelboard and branch-circuit number supplying them.

Branch circuits serving patient bed locations shall not be part of a multiwire branch circuit.

*Exception No. 1: Branch circuits serving only special purpose outlets or receptacles, such as portable X-ray outlets, shall not be required to be served from the same distribution panel or panels.*

*Exception No. 2: The requirements of 517.18(A) shall not apply to patient bed locations in clinics, medical and dental offices, and outpatient facilities; psychiatric, substance abuse, and rehabilitation hospitals; sleeping rooms of nursing homes; and limited care facilities meeting the requirements of 517.10(B)(2).*

*Exception No. 3: A general care (Category 2) patient bed location served from two separate transfer switches on the critical branch shall not be required to have circuits from the normal system.*

Commented [CB10]: See FR 8688

### **(B) Patient Bed Location Receptacles.**

Each patient bed location shall be provided with a minimum of eight receptacles. They shall be permitted to be of the single, duplex, or quadruplex type or any combination of the three. All receptacles shall be listed "hospital grade" and shall be so identified. The grounding terminal of each receptacle shall be connected to an insulated copper equipment grounding conductor sized in accordance with Table 250.122.

*Exception No. 1: The requirements of 517.18(B) shall not apply to psychiatric, substance abuse, and rehabilitation hospitals meeting the requirements of 517.10(B)(2).*

*Exception No. 2: Psychiatric security rooms shall not be required to have receptacle outlets installed in the room.*

Informational Note: It is not intended that there be a total, immediate replacement of existing non-hospital grade receptacles. It is intended, however, that non-hospital grade receptacles be replaced with hospital grade receptacles upon modification of use, renovation, or as existing receptacles need replacement.

Commented [CB11]: See FR 8690

### **(C) Designated Category 2 (General Care) ~~(Category 2)~~ Pediatric Locations.**

Receptacles that are located within the patient rooms, bathrooms, playrooms, and activity rooms of pediatric units or spaces with similar risk as determined by the health care facility's governing body by conducting a risk assessment, other than infant nurseries, shall be listed tamper-resistant or shall employ a listed tamper-resistant cover. [99: 6.3.2.2.1(D) ~~6.3.2.2.6.2(F)~~]

### **517.19 Category 1 (Critical Care) ~~(Category 1)~~ Spaces.**

#### **(A) Patient Bed Location Branch Circuits.**

Each patient bed location shall be supplied by at least two branch circuits, one or more from the critical branch and one or more circuits from the normal system. At least one branch circuit from the critical branch shall supply an outlet(s) only at that bed location.

The electrical receptacles or the cover plates for the electrical receptacles supplied from the life safety and critical branches shall have a distinctive color or marking so as to be readily identifiable. [99: [6.7.2.3.5\(B\)](#) ~~6.4.2.2.6.2(C)~~]

All branch circuits from the normal system shall be from a single panelboard. Critical branch receptacles shall be identified and shall also indicate the panelboard and circuit number supplying them.

The branch circuit serving patient bed locations shall not be part of a multiwire branch circuit.

*Exception No. 1: Branch circuits serving only special-purpose receptacles or equipment in ~~critical care~~ (Category 1) [\(critical care\)](#) spaces shall be permitted to be served by other panelboards.*

*Exception No. 2: [Category 1](#) ~~(critical care)~~ ~~(Category 1)~~ spaces served from two separate critical branch transfer switches shall not be required to have circuits from the normal system.*

## **(B) Patient Bed Location Receptacles.**

### **(1) Minimum Number and Supply.**

Each patient bed location shall be provided with a minimum of 14 receptacles, at least one of which shall be connected to either of the following:

- (1) The normal system branch circuit required in 517.19(A)
- (2) A critical branch circuit supplied by a different transfer switch than the other receptacles at the same patient bed location

### **(2) Receptacle Requirements.**

The receptacles required in 517.19(B)(1) shall be permitted to be single, duplex, or quadruplex type or any combination thereof. All receptacles shall be listed "hospital grade" and shall be so identified. The grounding terminal of each receptacle shall be connected to the reference grounding point by means of an insulated copper equipment grounding conductor.

### **(C) Operating Room Receptacles.**

**(1) Minimum Number and Supply.** Each operating room shall be provided with a minimum of 36 receptacles divided between at least two branch circuits. At least 12 receptacles, but no more than 24, shall be connected to either of the following:

- (1) The normal system branch circuit required in 517.19(A)
- (2) A critical branch circuit supplied by a different transfer switch than the other receptacles at the same location

### **(2) Receptacle Requirements.**

The receptacles shall be permitted to be of the locking or nonlocking type, single, duplex, or quadruplex types or any combination of the three. All nonlocking-type receptacles shall be listed hospital grade and so identified. The grounding terminal of each receptacle shall be connected to the reference grounding point by means of an insulated copper equipment grounding conductor.

### **(D) Patient Care Vicinity Grounding and Bonding (Optional).**

A patient care vicinity shall be permitted to have a patient equipment grounding point. The patient equipment grounding point, where supplied, shall be permitted to contain one or more listed grounding and bonding jacks. An equipment bonding jumper not smaller than 10 AWG shall be used to connect the grounding terminal of all grounding-type receptacles to the patient equipment grounding point. The bonding conductor shall be permitted to be arranged centrally or looped as convenient.

Informational Note: Where there is no patient equipment grounding point, it is important that the distance between the reference grounding point and the patient care vicinity be as short as possible to minimize any potential differences.

### **(E) Equipment Grounding and Bonding.**

Where a grounded electrical distribution system is used and metal feeder raceway or Type MC or MI cable that qualifies as an equipment grounding conductor in accordance with 250.118 is installed, grounding of enclosures and equipment, such as panelboards, switchboards, and switchgear, shall be ensured by one of the following bonding means at each termination or junction point of the metal raceway or Type MC or MI cable:

- (1) A grounding bushing and a continuous copper bonding jumper, sized in accordance with 250.122, with the bonding jumper connected to the junction enclosure or the ground bus of the panel
- (2) Connection of feeder raceways or Type MC or MI cable to threaded hubs or bosses on terminating enclosures
- (3) Other approved devices such as bonding-type locknuts or bushings. Standard locknuts shall not be used for bonding.

**(F) Additional Protective Techniques in [Category 1 \(Critical Care\)](#) ~~(Category 1)~~ Spaces (Optional).**

Isolated power systems shall be permitted to be used for [Category 1 \(critical care\)](#) ~~(Category 1)~~ spaces, and, if used, the isolated power system equipment shall be listed as isolated power equipment. The isolated power system shall be designed and installed in accordance with 517.160.

*Exception: The audible and visual indicators of the line isolation monitor shall be permitted to be located at the nursing station for the area being served.*

**(G) Isolated Power System Equipment Grounding.**

Where an isolated ungrounded power source is used and limits the first-fault current to a low magnitude, the equipment grounding conductor associated with the secondary circuit shall be permitted to be run outside of the enclosure of the power conductors in the same circuit.

Informational Note: Although it is permitted to run the grounding conductor outside of the conduit, it is safer to run it with the power conductors to provide better protection in case of a second ground fault.

Commented [CB12]: See FR 8697

**(H) Special-Purpose Receptacle Grounding.**

The equipment grounding conductor for special-purpose receptacles, such as the operation of mobile X-ray equipment, shall be extended to the reference grounding points of branch circuits for all locations likely to be served from such receptacles. Where such a circuit is served from an isolated ungrounded system, the grounding conductor shall not be required to be run with the power conductors; however, the equipment grounding terminal of the special-purpose receptacle shall be connected to the reference grounding point.

Commented [CB13]: See FR 8698

**517.20 Wet Procedure Locations.**

**(A) Receptacles and Fixed Equipment.**

Wet procedure locations shall be provided with special protection against electric shock. ~~[99:6.3.2.3.1] 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 the value of a Class A GFCI. [99:6.3.2.3.2] exceed a value of 6 mA

*Exception: Branch circuits supplying only listed, fixed, therapeutic and diagnostic equipment shall be permitted to be supplied from a grounded service, single- or 3-phase system, provided that*

- (a) *Wiring for grounded and isolated circuits does not occupy the same raceway, and*
- (b) *All conductive surfaces of the equipment are connected to an insulated copper equipment grounding conductor.*

#### **(B) Isolated Power Systems.**

Where an isolated power system is utilized, the isolated power equipment shall be listed as isolated power equipment, and the isolated power system shall be designed and installed in accordance with 517.160.

Informational Note: For requirements for installation of therapeutic pools and tubs, see Part VI of Article 680.

#### **517.21 Ground-Fault Circuit-Interrupter Protection for Personnel.**

Ground-fault circuit-interrupter protection for personnel shall not be required for receptacles installed in those critical care (Category 1) spaces where the toilet and basin are installed within the patient room.

Commented [CB14]: See FR 8796

### **Part III. Essential Electrical System (EES)**

**517.25 Scope.** The essential electrical system for these facilities shall comprise a system capable of supplying a limited amount of lighting and power service, which is considered essential for life safety and orderly cessation of procedures during the time normal electrical service is interrupted for any reason. This includes clinics, medical and dental offices, outpatient facilities, nursing homes, limited care facilities, hospitals, and other health care facilities serving patients.

Informational Note: For information on the need for an essential electrical system, see NFPA 99-2015, *Health Care Facilities Code*.

Commented [CB15]: See FR 8712

## 517.26 Application of Other Articles.

The life safety branch of the essential electrical system shall meet the requirements of Article 700, except as amended by Article 517.

Informational Note No. 1: For additional information, see NFPA 110-2013, *Standard for Emergency and Standby Power Systems*.

Informational Note No. 2: For additional information, see 517.29 and NFPA 99-2015, *Health Care Facilities Code*.

Commented [CB16]: See FR 8713

## 517.29 Essential Electrical Systems for Hospitals and Other Health Care Facilities.

### (A) Applicability.

The requirements of Part III, 517.29 through 517.30, shall apply to critical care (Category 1) and general care (Category 2) hospitals and other health care facilities using Type 1 essential electrical systems where patients are sustained by electrical life-support equipment.

Informational Note No. 1: For performance, maintenance, and testing requirements of essential electrical systems in hospitals, see NFPA 99-2015, *Health Care Facilities Code*. For installation of centrifugal fire pumps, see NFPA 20-2013, *Standard for the Installation of Stationary Pumps for Fire Protection*.

Informational Note No. 2: For additional information on Type 1 and Type 2 essential electrical systems, see NFPA 99-2015, *Health Care Facilities Code*.

(B) Critical care (Category 1) spaces shall be served only by a Type 1 essential electrical system. [99:6.3.2.2.10.1]

Commented [CB17]: See FR 8714

## 517.30 Sources of Power.

(A) **Two Independent Power Sources.** Essential electrical systems shall have a minimum of the following two independent sources of power: a normal source generally supplying the entire electrical system and one or



more alternate source(s) for use when the normal source is interrupted.

[99:6.4.1.1.4]

## **(B) Types of Power Sources.**

**(1) Generating Units.** Where the normal source consists of generating units on the premises, the alternate source shall be either another generating set or an external utility service. [99:6.4.1.1.5]

**(2) Fuel Cell Systems.** Fuel cell systems shall be permitted to serve as the alternate source for all or part of an essential electrical system, provided the following conditions apply:

- (1) Installation of fuel cells shall comply with the requirements in Parts I through VII of Article 692 for 1000 volts or less and Part VIII for over 1000 volts.

Informational Note: For information on installation of stationary fuel cells, see NFPA 853-2015, *Standard for Installation of Stationary Fuel Cell Power Systems*. [99:6.4.1.1.7]

- (2)  $N + 1$  units shall be provided where  $N$  units have sufficient capacity to supply the demand loads of the portion of the system served.

[99:6.4.1.7.2]

- (3) System shall be able to assume loads within 10 seconds of loss of normal power source.

- (4) System shall have a continuing source of fuel supply, together with sufficient on-site fuel storage for the essential system type.

- (5) A connection shall be provided for a portable diesel generator to supply life safety and critical portions of the distribution system.

[99:6.4.1.1.7.5(1) through (5)]

- (6) Fuel cell systems shall be listed for emergency system use.

Commented [CB18]: See FR 8719

**(C) Location of Essential Electrical System Components.** Essential electrical system components shall be located to minimize interruptions caused by natural forces common to the area (e.g., storms, floods, earthquakes, or hazards created by adjoining structures or activities). Installations of electrical services shall be located to reduce possible interruption of normal electrical services resulting from similar causes as well as possible disruption of normal electrical service due to internal wiring and equipment failures. Feeders shall be located to provide physical

separation of the feeders of the alternate source and from the feeders of the normal electrical source to prevent possible simultaneous interruption.

Informational Note: Facilities in which the normal source of power is supplied by two or more separate central station-fed services experience greater than normal electrical service reliability than those with only a single feed. Such a dual source of normal power consists of two or more electrical services fed from separate generator sets or a utility distribution network that has multiple power input sources and is arranged to provide mechanical and electrical separation so that a fault between the facility and the generating sources is not likely to cause an interruption of more than one of the facility service feeders.

Commented [CB19]: See FR 8723

### 517.31 Requirements for the Essential Electrical System.

**(A) Separate Branches.** Essential electrical systems for hospitals shall be comprised of three separate branches capable of supplying a limited amount of lighting and power service that is considered essential for life safety and effective hospital operation during the time the normal electrical service is interrupted for any reason. The three branches are life safety, critical, and equipment.

The division between the branches shall occur at transfer switches where more than one transfer switch is required [99:6.4.2.2.1.2]

Commented [CB20]: See FR 8732

#### **(B) Transfer Switches.**

The number of transfer switches to be used shall be based on reliability and design. Each branch of the essential electrical system shall have one or more transfer switches.

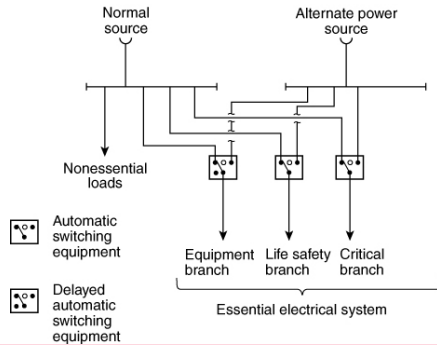
One transfer switch and downstream distribution system shall be permitted to serve one or more branches in a facility with a maximum demand on the essential electrical system of 150 kVA.

Informational Note No. 1: See NFPA 99-2015, *Health Care Facilities Code*, 6.4.3.2, Transfer Switches; 6.4.2.1.5, Automatic Transfer Switch Features; 6.4.2.1.5.15, Nonautomatic Transfer Switch Features; and 6.4.2.1.7, Nonautomatic Transfer Device Features.

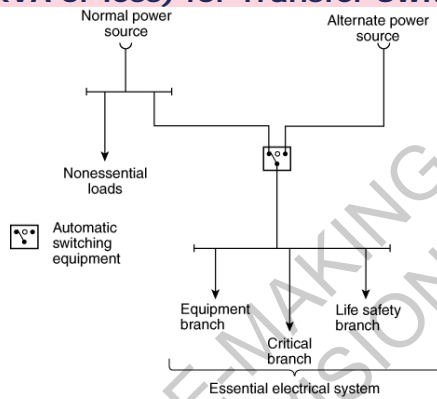
Informational Note No. 2: See Informational Note Figure 517.31(a).

Informational Note No. 3: See Informational Note Figure 517.31(b).

**Figure Informational Note Figure 517.31(a) Hospital — Minimum Requirement (greater than 150 kVA) for Transfer Switch Arrangement.**



**Figure Informational Note Figure 517.31(b) Hospital — Minimum Requirement (150 kVA or less) for Transfer Switch Arrangement.**



Commented [CB21]: See FR 8740

### (1) Optional Loads.

Loads served by the generating equipment not specifically named in Article 517 shall be served by their own transfer switches such that the following conditions apply:

- (1) These loads shall not be transferred if the transfer will overload the generating equipment.
- (2) These loads shall be automatically shed upon generating equipment overloading.

### (2) Contiguous Facilities.

Hospital power sources and alternate power sources shall be permitted to serve the essential electrical systems of contiguous or same site facilities.

### (C) Wiring Requirements.

**(1) Separation from Other Circuits.** The life safety branch and critical branch of the essential electrical system shall be kept entirely independent of all other wiring and equipment and shall not enter the same raceways, boxes, or cabinets with each other or other wiring.

Where general care locations are served from two separate transfer switches on the essential electrical 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 essential electrical system in accordance with 517.19(A), Exception No. 2, the critical care circuits from the two separate systems shall be kept independent of each other.

Wiring of the life safety branch and the critical branch shall be permitted to occupy the same raceways, boxes, or cabinets of other circuits not part of the branch where such wiring complies with one of the following:

- (1) Is in transfer equipment enclosures
- (2) Is in exit or emergency luminaires supplied from two sources
- (3) Is in a common junction box attached to exit or emergency luminaires supplied from two sources
- (4) Is for two or more circuits supplied from the same branch and same transfer switch

The wiring of the equipment branch shall be permitted to occupy the same raceways, boxes, or cabinets of other circuits that are not part of the essential electrical system.

Commented [CB22]: See FR 8772

**(2) Isolated Power Systems.** Where isolated power systems are installed in any of the areas in 517.34(A)(1) and (A)(2), each system shall be supplied by an individual circuit serving no other load.

**(3) Mechanical Protection of the Essential Electrical System.** The wiring of the life safety and critical branches shall be mechanically protected. Where installed as branch circuits in patient care spaces, the installation shall comply with the requirements of 517.13(A) and (B). Only the following wiring methods shall be permitted:

- (1) Nonflexible metal raceways, Type MI cable, Type RTRC marked with the suffix -XW, or Schedule 80 PVC conduit. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.
- (2) Where encased in not less than 50 mm (2 in.) of concrete, Schedule 40 PVC conduit, flexible nonmetallic or jacketed metallic raceways, or jacketed metallic cable assemblies listed for installation in concrete. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.
- (3) Listed flexible metal raceways and listed metal sheathed cable assemblies in any of the following:
  - a. Where used in listed prefabricated medical headwalls
  - b. In listed office furnishings
  - c. Where fished into existing walls or ceilings, not otherwise accessible and not subject to physical damage
  - d. Where necessary for flexible connection to equipment
  - e. For equipment that requires a flexible connection due to movement, vibration, or operation
  - f. Luminaires installed in rigid ceiling structures where there is no access above the ceiling space after the luminaire is installed
- (4) Flexible power cords of appliances or other utilization equipment connected to the emergency system.
- (5) Cables for Class 2 or Class 3 systems permitted by Part VI of this Article, with or without raceways.

Informational Note: See 517.13 for additional grounding requirements in patient care areas.

Commented [CB23]: See FR 8748

**(D) Capacity of Systems.** The essential electrical system shall have the capacity and rating to meet the maximum actual demand likely to be produced by the connected load.

Feeders shall be sized in accordance with 215.2 and Part III of Article 220. The generator set(s) shall have the capacity and rating to meet the demand produced by the load at any given time.

Demand calculations for sizing of the generator set(s) shall be based on any of the following:

- (1) Prudent demand factors and historical data
- (2) Connected load
- (3) Feeder calculation procedures described in Article 220
- (4) Any combination of the above

The sizing requirements in 700.4 and 701.4 shall not apply to hospital generator set(s).

Commented [CB24]: See FR 8773

**(E) Receptacle Identification.** The electrical receptacles or the cover plates for the electrical receptacles ~~or the electrical receptacles themselves~~ supplied from the life ~~essential electrical system~~ safety and critical branches shall have a distinctive color or marking so as to be readily identifiable.  
[99: ~~6.4.2.2.6.2(C)~~ 6.7.2.3.5(B)]

**(F) Feeders from Alternate Power Source.** A single feeder supplied by a local or remote alternate source shall be permitted to supply the essential electrical system to the point at which the life safety, critical, and equipment branches are separated. Installation of the transfer equipment shall be permitted at other than the location of the alternate power source.

**(G) Coordination.** Overcurrent protective devices serving the essential electrical system shall be coordinated for the period of time that a fault's duration extends beyond 0.1 second.

*Exception No. 1: Between transformer primary and secondary overcurrent protective devices, where only one overcurrent protective device or set of overcurrent protective devices exists on the transformer secondary.*

*Exception No. 2: Between overcurrent protective devices of the same size (ampere rating) in series.*

Informational Note: The terms *coordination* and *coordinated* as used in this section do not cover the full range of overcurrent conditions.

### 517.32 Branches Requiring Automatic Connection.

**(A)** Those functions of patient care depending on lighting or appliances that are connected to the essential electrical system shall be divided into the life safety branch and the critical branch, as described in 517.33 and 517.34.

**(B)** The life safety and critical branches shall be installed and connected to the alternate power source specified in 517.30(A) and (B) so that all functions specified herein for the life safety and critical branches are automatically restored to operation within 10 seconds after interruption of the normal source. [~~99:6.4.3.16~~6.7.5.3.1]

**517.33 Life Safety Branch.** The life safety branch shall be limited to circuits essential to life safety. [~~99:6.7.5.1.2.3~~]

No functions other than those listed in 517.33(A) through (H) shall be connected to the life safety branch. The life safety branch shall supply power as follows:

**(A) Illumination of Means of Egress.** Illumination of means of egress such as lighting required for corridors, passageways, stairways, and landings at exit doors, and all necessary ways of approach to exits. Switching arrangements to transfer patient corridor lighting in hospitals from general illumination circuits to night illumination circuits shall be permitted, provided only one of two circuits can be selected and both circuits cannot be extinguished at the same time.

Informational Note: See NFPA ~~101-2015~~2018, *Life Safety Code*, Sections 7.8 and 7.9.

**(B) Exit Signs.** Exit signs and exit directional signs.

Informational Note: See NFPA ~~101-2012~~2018, *Life Safety Code*, Section 7.10.

**(C) Alarm and Alerting Systems.** Alarm and alerting systems including the following:

- (1) Fire alarm systems
- (2) Alarm and alerting systems (other than fire alarm systems) shall be connected to the life safety branch or critical branch.  
[~~99:6.4.2.2.3.36~~6.7.5.1.2.5]
- (3) Alarms for systems used for the piping of nonflammable medical gases
- (4) Mechanical, control, and other accessories required for effective life safety systems operation shall be permitted to be connected to the life safety branch.

**(D) Communications Systems.** Hospital communications systems, where used for issuing instructions during emergency conditions.

[~~99:6.4.2.2.3.2(3)~~6.7.5.1.2.4(3)]

**(E) Generator Set Locations.** Generator set locations as follows:

- (1) Task illumination
- (2) Battery charger for emergency battery-powered lighting unit(s)
- (3) Select receptacles at the generator set location and essential electrical system transfer switch locations. [~~99:6.4.2.2.3.2(4)~~ 6.7.5.1.2.4(4)]

**(F) Generator Set Accessories.** Generator set accessories as required for generator performance. Loads dedicated to a specific generator, including the fuel transfer pump(s), ventilation fans, electrically operated louvers, controls, cooling system, and other generator accessories essential for generator operation, shall be connected to the life safety branch or to the output terminals of the generator with overcurrent protective devices. [~~99:6.4.2.2.3.4~~ 6.7.5.1.2.6]

**(G) Elevators.** Elevator cab lighting, control, communications, and signal systems. [~~99:6.4.2.2.3.2(5)~~ 6.7.5.1.2.4(5)]

**(H) Automatic Doors.** Electrically powered doors used for building egress. [~~99:6.4.2.2.3.2(6)~~ 6.7.5.1.2.4(6)]

#### **517.34 Critical Branch.**

**(A) Task Illumination and Selected Receptacles.** The critical branch of the essential electrical system shall supply power for task illumination, fixed equipment, selected receptacles, and special power circuits serving the following areas and functions related to patient care:

- (1) Critical care (Category 1) spaces that utilize anesthetizing gases, task illumination, selected receptacles, and fixed equipment
- (2) The isolated power systems in special environments
- (3) Patient care spaces, task illumination, and selected receptacles in the following:
  - a. Infant nurseries
  - b. Medication preparation areas
  - c. Pharmacy dispensing areas
  - d. Selected acute nursing areas



- e. Psychiatric bed areas (omit receptacles)
  - f. Ward treatment rooms
  - g. Nurses' stations (unless adequately lighted by corridor luminaires)
- (4) Additional specialized patient care task illumination and receptacles, where needed
- (5) Nurse call systems
- (6) Blood, bone, and tissue banks
- (7) Telephone and data equipment rooms and closets
- (8) Task illumination, selected receptacles, and selected power circuits for the following:
- a. General care (Category 2) beds (at least one duplex receptacle in each patient bedroom)
  - b. Angiographic labs
  - c. Cardiac catheterization labs
  - d. Coronary care units
  - e. Hemodialysis rooms or areas
  - f. Emergency room treatment areas (selected)
  - g. Human physiology labs
  - h. Intensive care units
  - i. Postoperative recovery rooms (selected)
- (9) Additional task illumination, receptacles, and selected power circuits needed for effective facility operation, including single-phase fractional horsepower motors, shall be permitted to be connected to the critical branch. [99:6.4.2.2.4.2(9)]

Commented [CB25]: See FR 8774

**(B) Switching.** It shall be permitted to control task illumination on the critical branch.

**(C) Subdivision of the Critical Branch.** It shall be permitted to subdivide the critical branch into two or more branches. [99: 6.7.5.1.3.1]

Informational Note: It is important to analyze the consequences of supplying an area with only critical care branch power when failure occurs between the area and the transfer switch. Some proportion of normal and critical power or critical power from separate transfer switches may be appropriate.

### **517.35 Equipment Branch Connection to Alternate Power Source.**

The equipment branch shall be installed and connected to the alternate power source such that the equipment described in 517.35(A) is automatically restored to operation at appropriate time-lag intervals following the energizing of the life safety and critical branches.

[99:6.7.5.1.4.2(A)]

The arrangement of the connection to the alternate power source shall also provide for the subsequent connection of equipment described in 517.35(B). [99:6.4.2.2.5.26.7.5.1.4.2(B)]

*Exception: For essential electrical systems under 150 kVA, deletion of the time-lag intervals feature for delayed automatic connection to the equipment system shall be permitted.*

#### **(A) Equipment for Delayed Automatic Connection.**

The following equipment shall be permitted to be arranged for delayed automatic connection to the alternate power source:

- (1) Central suction systems serving medical and surgical functions, including controls. Such suction systems shall be permitted on the critical branch.
- (2) Sump pumps and other equipment required to operate for the safety of major apparatus, including associated control systems and alarms.
- (3) Compressed air systems serving medical and surgical functions, including controls. Such air systems shall be permitted on the critical branch.
- (4) Smoke control and stair pressurization systems, or both.
- (5) Kitchen hood supply or exhaust systems, or both, if required to operate during a fire in or under the hood.
- (6) Supply, return, and exhaust ventilating systems for the following:
  - (a) Airborne infectious/isolation rooms
  - (b) Protective environment rooms

- (c) Exhaust fans for laboratory fume hoods
- (d) Nuclear medicine areas where radioactive material is used
- (e) Ethylene oxide evacuation
- (f) Anesthesia evacuation.

Where delayed automatic connection is not appropriate, such ventilation systems shall be permitted to be placed on the critical branch. [99: ~~6.4.2.2.5.3(A)(6) and (B)~~ 6.7.5.1.4.3 (A) and (B)]

- (7) Supply, return, and exhaust ventilating systems for operating and delivery rooms.
- (8) Supply, return, exhaust ventilating systems and/or air-conditioning systems serving telephone equipment rooms and closets and data equipment rooms and closets.

*Exception: Sequential delayed automatic connection to the alternate power source to prevent overloading the generator shall be permitted where engineering studies indicate it is necessary.*

#### **(B) Equipment for Delayed Automatic or Manual Connection.**

The following equipment shall be permitted to be arranged for either delayed automatic or manual connection to the alternate power source:

- (1) Heating equipment to provide heating for operating, delivery, labor, recovery, intensive care, coronary care, nurseries, infection/isolation rooms, emergency treatment spaces, and general patient rooms and pressure maintenance (jockey or make-up) pump(s) for water-based fire protection systems

*Exception: Heating of general patient rooms and infection/isolation rooms during disruption of the normal source shall not be required under any of the following conditions:*

- (a) *The outside design temperature is higher than  $-6.7^{\circ}\text{C}$  ( $20^{\circ}\text{F}$ ).*
- (b) *The outside design temperature is lower than  $-6.7^{\circ}\text{C}$  ( $20^{\circ}\text{F}$ ), and where a selected room(s) is provided for the needs of all confined patients, only such room(s) need be heated.*
- (c) *The facility is served by a dual source of normal power.*

Informational Note No. 1: The design temperature is based on the 97.5 percent design value as shown in Chapter 24 of the ASHRAE Handbook of Fundamentals (2013).

Informational Note No. 2: For a description of a dual source of normal power, see 517.30(C).

2. An elevator(s) selected to provide service to patient, surgical, obstetrical, and ground floors during interruption of normal power. In instances where interruption of normal power would result in other elevators stopping between floors, throw-over facilities shall be provided to allow the temporary operation of any elevator for the release of patients or other persons who may be confined between floors.
3. Hyperbaric facilities.
4. Hypobaric facilities.
5. Automatically operated doors.
6. Minimal electrically heated autoclaving equipment shall be permitted to be arranged for either automatic or manual connection to the alternate source.
7. Controls for equipment listed in 517.35.
8. Other selected equipment shall be permitted to be served by the equipment system. [~~99: 6.4.2.2.5.4(9)~~6.7.5.1.4.4 (1-9)]

**(C) AC Equipment for Nondelayed Automatic Connection.** Generator accessories, including but not limited to, the transfer fuel pump, electrically operated louvers, and other generator accessories essential for generator operation shall be arranged for automatic connection to the alternate power source. [~~99:6.5.2.2.3.2]~~

Commented [CB26]: See FR 8777

#### **517.40 Type 2 Essential Electrical Systems for Nursing Homes and Limited Care Facilities.**

Informational Note: Nursing homes and other limited care facilities can be classified as critical care (Category 1) or general care (Category 2) patient care space depending on the design and type of care administered in the facility. For small, less complex facilities, only minimal alternate lighting and alarm service may be required. At nursing homes and other limited care facilities where patients are not sustained by electrical life-support equipment or inpatient hospital care the requirements of 517.40 through 517.41 apply. If the level of care is comparable to that provided in a hospital, see the essential electrical system requirements of 517.29 through 517.30.

**(A) Applicability.** The requirements of Part III, 517.40(C) through 517.41, shall apply to nursing homes and limited care facilities.

*Exception: The requirements of Part III, 517.40(C) through 517.41, shall not apply to freestanding buildings used as nursing homes and limited care facilities, provided that the following apply:*

- (1) Admitting and discharge policies are maintained that preclude the provision of care for any patient or resident who may need to be sustained by electrical life-support equipment.
- (2) No surgical treatment requiring general anesthesia is offered.
- (3) An automatic battery-operated system(s) or equipment shall be effective for at least 1½ hours and is otherwise in accordance with 700.12 and that shall be capable of supplying lighting for exit lights, exit corridors, stairways, nursing stations, medical preparation areas, boiler rooms, and communications areas. This system shall also supply power to operate all alarm systems.

Informational Note: See NFPA 101-2015, *Life Safety Code*.

**(B) Inpatient Hospital Care Facilities.** For those nursing homes and limited care facilities that admit patients who need to be sustained by electrical life support equipment, the essential electrical system from the source to the portion of the facility where such patients are treated shall comply with the requirements of Part III, 517.29 through 517.30.

**(C) Facilities Contiguous or Located on the Same Site with Hospitals.** Nursing homes and limited care facilities that are contiguous or located on the same site with a hospital shall be permitted to have their essential electrical systems supplied by the hospital.

Informational Note No. 1: For performance, maintenance, and testing requirements of essential electrical systems in nursing homes and limited care facilities, see NFPA 99-2015, *Health Care Facilities Code*.

Informational Note No. 2: Where optional loads include contiguous or same-site facilities not covered in this *Code*, see the requirements of Article 700 of this *Code*; NFPA 101-2015, *Life Safety Code*; and other applicable NFPA requirements for emergency egress under loadshed conditions.

Commented [CB27]: See FR 8710

#### 517.41 Required Power Sources.

**(A) Two Independent Power Sources.** Essential electrical systems shall have a minimum of the following two independent sources of power: a normal source generally supplying the entire electrical system and one or more alternate sources for use when the normal source is interrupted. [99: 6.4.1.1.46.7.1.2.2]

**(B) Types of Power Sources.** Where the normal source consists of generating units on the premises, the alternate source shall be either

another generating set or an external utility service. [99:  
6.4.1.1-56.7.1.2.3]

**(C) Location of Essential Electrical System Components.** Essential electrical systems shall be located to minimize interruptions caused by natural forces common to the area (e.g., storms, floods, earthquakes, or hazards created by adjoining structures or activities). [99:6.2.4.1]

Installations of electrical services shall be located to reduce possible interruption of normal electrical services resulting from similar causes as well as possible disruption of normal electrical service due to internal wiring and equipment failures. [99:6.2.4.2]

Feeders shall be located to give physical separation of the feeders of the alternate source and from the feeders of the normal electrical source to prevent possible simultaneous interruption. [99:6.2.4.3]

#### **517.42 Essential Electrical Systems.**

**(A) General** Essential electrical systems for nursing homes and limited care facilities shall be divided into the following two branches, the life safety branch and the equipment branch. [99:6.5.2.2.1.2]

The division between the branches shall occur at transfer switches where more than one transfer switch is required.

Informational Note No. 1: Type 2 essential electrical systems are comprised of two separate branches capable of supplying a limited amount of lighting and power service, that is considered essential for the protection of life and safety and effective operation of the institution during the time normal electrical service is interrupted for any reason. These two separate branches are the life safety and equipment branches.

Informational Note No. 2 : For more information see NFPA 99-2015 , *Health Care Facilities Code*.

**(B) Transfer Switches.** The number of transfer switches to be used shall be based on reliability, design, and load considerations. [99:6.5.2.2.1.4]

- (1) Each branch of the essential electrical system shall have one or more transfer switches. [99:6.5.2.2.1.4(A)]

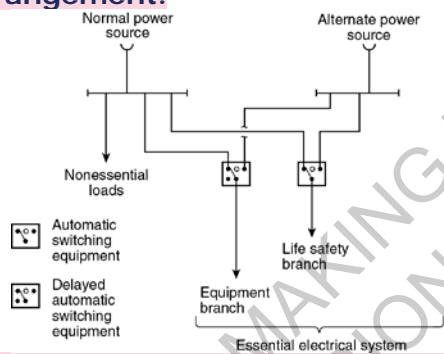
(2) One transfer switch shall be permitted to serve one or more branches or systems in a facility with a continuous load on the switch of 150 kVA (120 kW) or less. [99:6.5.2.2.1.4(B)]

Informational Note No. 1: See NFPA 99-2015, *Health Care Facilities Code*, 6.5.3.2, Transfer Switches ; 6.4.2.1.5, Automatic Transfer Switch Features; 6.4.2.1.5 Non-Automatic Transfer Switch Features and 6.4.2.1.7, Nonautomatic Transfer Device Features.

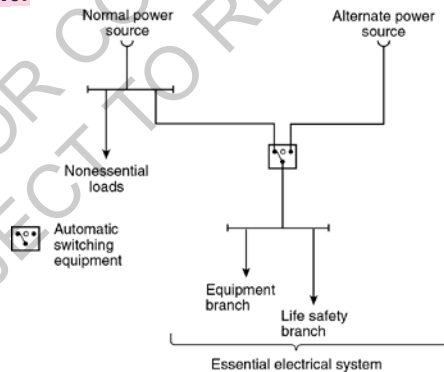
Informational Note No. 2: See Informational Note Figure 517.42(a).

Informational Note No. 3: See Informational Note Figure 517.42(b).

**Figure Informational Note Figure 517.42(a) Type 2 Essential Electrical Systems (Nursing Home and Limited Health Care Facilities) — Minimum Requirement (greater than 150 kVA) for Transfer Switch Arrangement.**



**Figure Informational Note Figure 517.42(b) Type 2 Essential Electrical Systems (Nursing Home and Limited Health Care Facilities) — Minimum Requirement (150 kVA or less) for Transfer Switch Arrangement.**



**(C) Capacity of System.** The essential electrical system shall have adequate capacity to meet the demand for the operation of all functions and equipment to be served by each branch at one time.

**(D) Separation from Other Circuits.** The life safety branch and equipment branch shall be kept entirely independent of all other wiring and equipment. [99:6.5.2.2.4.1]

These circuits shall not enter the same raceways, boxes, or cabinets with other wiring except as follows:

- (1) In transfer switches
- (2) In exit or emergency luminaires supplied from two sources
- (3) In a common junction box attached to exit or emergency luminaires supplied from two sources

**(E) Receptacle Identification.** The electrical receptacles or the cover plates for the electrical receptacles supplied from the life safety or equipment branches shall have a distinctive color or marking so as to be readily identifiable. [99:6.5.2.2.4.2]

Informational Note: If color is used to identify these receptacles, the same color should be used throughout the facility. [99:A6.5.2.2.4.2]

Commented [CB28]: See FR 8811

#### **517.43 Automatic Connection to Life Safety and Equipment Branch.**

The life safety and equipment branches shall be installed and connected to the alternate source of power specified in 517.41 so that all functions specified herein shall be automatically restored to operation within 10 seconds after the interruption of the normal source. [99:6.7.6.4.1]

No functions other than those listed in 517.43(A) through (G) shall be connected to the life safety branch. [99:6.7.6.2.1.4]

The life safety branch shall supply power ~~as follows: for the following lighting, receptacles, and equipment.~~

##### **(A) Illumination of Means of Egress.**

Illumination of means of egress as is necessary for corridors, passageways, stairways, landings, and exit doors and all ways of approach to exits.

Switching arrangement to transfer patient corridor lighting from general illumination circuits shall be permitted, providing only one of two circuits can be selected and both circuits cannot be extinguished at the same time.

Informational Note: See NFPA 101-2015~~2018~~, *Life Safety Code*, Sections 7.8 and 7.9.



**(B) Exit Signs.**

Exit signs and exit directional signs.

Informational Note: See NFPA ~~101-2015~~2018, *Life Safety Code*, Section 7.10.

**(C) Alarm and Alerting Systems.**

Alarm and alerting systems, including the following:

(1) Fire alarms

Informational Note: See NFPA ~~101-2015~~2018, *Life Safety Code*, Sections 9.6 and 18.3.4.

(2) Alarms required for systems used for the piping of nonflammable medical gases

Informational Note: See NFPA ~~99-2015~~2018, *Health Care Facilities Code*, ~~6.5.2.2.2.1(3)~~6.7.5.1.2.5.

**(D) Communications Systems.** Communications systems, where used for issuing instructions during emergency conditions. [~~99:6.5.2.2.2.1(4)~~ 6.7.5.1.2.4(3)]

~~**(E) Dining and Recreation Areas.** Sufficient lighting in dining and recreation areas to provide illumination to exit ways at a minimum of 5 ft-candles. [~~99:6.5.2.2.2.1(5)~~]~~

**(E) Generator Set Location.** Task illumination and selected receptacles ~~in~~at the generator set locations and essential electrical system transfer switch locations. [~~99:6.5.2.2.2.1(6)~~ 6.7.5.1.2.4(4)(a) and (c)]

**(F) Elevators.** Elevator cab lighting, control, communications, and signal systems. [~~99:6.5.2.2.2.1(7)~~ 6.7.5.1.2.4(5)]

**517.44 Connection to Equipment Branch.** The equipment branch shall be installed and connected to the alternate power source so that the equipment listed in 517.44(A) shall be automatically restored to operation at appropriate time-lag intervals following the restoration of the life safety branch to operation. [~~99:6.5.2.2.3.1(A)~~ 6.7.5.1.4.2(A)]

The equipment branch arrangement shall also provide for the additional connection of equipment listed in 517.44(B). [~~99:6.5.2.2.3.1~~]

*Exception: For essential electrical systems under 150 kVA, deletion of the time-lag intervals feature for delayed automatic connection to the equipment branch shall be permitted.*

**(A) Delayed Automatic Connections to Equipment Branch.**

The following equipment shall be permitted to be connected to the equipment branch and shall be arranged for delayed automatic connection to the alternate power source:

- (1) Task illumination and selected receptacles in the following:
  - (a) Patient care spaces
  - (b) Medication preparation spaces
  - (c) Pharmacy dispensing areas
  - (d) Nurses' stations (unless adequately lighted by corridor luminaires)
- (2) Supply, return, and exhaust ventilating systems for airborne infectious isolation rooms
- (3) Sump pumps and other equipment required to operate for the safety of major apparatus and associated control systems and alarms
- (4) Smoke control and stair pressurization systems
- (5) Kitchen hood supply or exhaust systems, or both, if required to operate during a fire in or under the hood
- (6) Nurse call systems

[99: 6.5.2.2.3.36.7.6.2.1.6(D)(1) through (6)]

**(B) Delayed Automatic or Manual Connection to the Equipment Branch.**

The following equipment shall be permitted to be connected to the critical equipment branch and shall be arranged for either delayed automatic or manual connection to the alternate power source:

- (1) Heating equipment to provide heating for patient rooms.

*Exception: Heating of general patient rooms during disruption of the normal source shall not be required under any of the following conditions:*

- (1) *The outside design temperature is higher than -6.7°C (20°F).*
- (2) *The outside design temperature is lower than -6.7°C (20°F) and where a selected room(s) is provided for the needs of all confined patients, only such room(s) need be heated.*

(3) The facility is served by a dual source of normal power as described in 517.41(C), Informational Note.

Informational Note: The outside design temperature is based on the 97.5 percent design values, as shown in Chapter 24 of the ASHRAE Handbook of Fundamentals (2013).

(4) Elevator service — in instances where disruption of power would result in elevators stopping between floors, throw-over facilities shall be provided to allow the temporary operation of any elevator for the release of passengers. For elevator cab lighting, control, and signal system requirements, see 517.43(G).

(5) Additional illumination, receptacles, and equipment shall be permitted to be connected only to the critical branch.

[99:6.5.2.2.3.4(A), (B), and (C)]

Commented [CB29]: See FR 8780

#### 517.45 Essential Electrical Systems for Other Health Care Facilities.

**(A) Essential Electrical Distribution.** If required by the governing body, the essential electrical distribution system for Category 3 (basic care ~~(Category 3)~~) patient care spaces shall be comprised of an alternate power system capable of supplying a limited amount of lighting and power service for the orderly cessation of procedures during a time normal electrical service is interrupted.

Informational Note: See NFPA 99-2015/2018, *Health Care Facilities Code*.

**(B) Electrical Life Support Equipment.** Where electrical life support equipment is required, the essential electrical distribution system shall be as described in 517.29 through 517.30.

**(C) Category 1 (Critical Care) ~~(Category 1)~~ Patient Care Spaces.** Where Category 1 (critical care) patient care ~~(Category 1)~~ spaces are present, the essential electrical distribution system shall be as described in 517.29 through 517.30.

**(D) General Care (Category 2) Patient Care Spaces.** Where general care (Category 2) patient care spaces are present, the essential electrical distribution system shall be as described in 517.40 through 517.45.

Commented [CB30]: See FR 8782

**(E) Power Systems.** If required, alternate power sources acceptable to the governing body shall comply with the requirements of NFPA 99-~~2015~~2018, *Health Care Facilities Code*.

#### Part IV. Inhalation Anesthetizing Locations

Informational Note: For further information regarding safeguards for anesthetizing locations, see NFPA 99-~~2015~~2018, *Health Care Facilities Code*.

##### 517.60 Anesthetizing Location Classification.

Informational Note: If either of the anesthetizing locations in 517.60(A) or 517.60(B) is designated a wet procedure location, refer to 517.20.

##### (A) Hazardous (Classified) Location.

**(1) Use Location.** In a location where flammable anesthetics are employed, the entire area shall be considered to be a Class I, Division 1 location that extends upward to a level 1.52 m (5 ft) above the floor. The remaining volume up to the structural ceiling is considered to be above a hazardous (classified) location. [~~99:Annex E, E.1, and E.2~~]

**Commented [b31]:** NFPA 99 did not have these Annexes in 2015 and don't in 2018

**(2) Storage Location.** Any room or location in which flammable anesthetics or volatile flammable disinfecting agents are stored shall be considered to be a Class I, Division 1 location from floor to ceiling.

**(B) ~~Other-Than-Hazardous (Classified)~~Unclassified Location.** Any inhalation anesthetizing location designated for the exclusive use of nonflammable anesthetizing agents shall be considered to be ~~an other-than-hazardous (classified)unclassified~~ location.

**Commented [b32]:** See Article 100 definition for Unclassified Location

##### 517.61 Wiring and Equipment.

##### (A) Within Hazardous (Classified) Anesthetizing Locations.

**(1) Isolation.** Except as permitted in 517.160, each power circuit within, or partially within, a flammable anesthetizing location as referred to in 517.60 shall be isolated from any distribution system by the use of an isolated power system.

**(2) Design and Installation.** Where an isolated power system is utilized, the isolated power equipment shall be listed as isolated power equipment, and the isolated power system shall be designed and installed in accordance with 517.160.

**(3) Equipment Operating at More Than 10 Volts.** In hazardous (classified) locations referred to in 517.60, all fixed wiring and equipment and all portable equipment, including lamps and other utilization equipment, operating at more than 10 volts between conductors shall comply with the requirements of 501.1 through 501.25, and 501.100 through 501.150, and 501.30(A) and 501.30(B) for Class I, Division 1 locations. All such equipment shall be specifically approved for the hazardous atmospheres involved.

**(4) Extent of Location.** Where a box, fitting, or enclosure is partially, but not entirely, within a hazardous (classified) location(s), the hazardous (classified) location(s) shall be considered to be extended to include the entire box, fitting, or enclosure.

**(5) Receptacles and Attachment Plugs.** Receptacles and attachment plugs in a hazardous (classified) location(s) shall be listed for use in Class I, Group C hazardous (classified) locations and shall have provision for the connection of a grounding conductor.

**(6) Flexible Cord Type.** Flexible cords used in hazardous (classified) locations for connection to portable utilization equipment, including lamps operating at more than 8 volts between conductors, shall be of a type approved for extra-hard usage in accordance with Table 400.4 and shall include an additional conductor for grounding.

Commented [CB33]: See FR 8785

**(7) Flexible Cord Storage.** A storage device for the flexible cord shall be provided and shall not subject the cord to bending at a radius of less than 75 mm (3 in.).

**(B) Above Hazardous (Classified) Anesthetizing Locations.**

**(1) Wiring Methods.** Wiring above a hazardous (classified) location referred to in 517.60 shall be installed in rigid metal conduit, electrical metallic tubing, intermediate metal conduit, Type MI cable, or Type MC cable that employs a continuous, gas/vaportight metal sheath.

**(2) Equipment Enclosure.** Installed equipment that may produce arcs, sparks, or particles of hot metal, such as lamps and lampholders for fixed lighting, cutouts, switches, generators, motors, or other equipment having make-and-break or sliding contacts, shall be of the totally enclosed type or be constructed so as to prevent escape of sparks or hot metal particles.

*Exception: Wall-mounted receptacles installed above the hazardous (classified) location in flammable anesthetizing locations shall not be required to be totally enclosed or have openings guarded or screened to prevent dispersion of particles.*

**(3) Luminaires.** Surgical and other luminaires shall conform to 501.130(B).

*Exception No. 1: The surface temperature limitations set forth in 501.130(B)(1) shall not apply.*

*Exception No. 2: Integral or pendant switches that are located above and cannot be lowered into the hazardous (classified) location(s) shall not be required to be explosionproof.*

**(4) Seals.** Listed seals shall be provided in conformance with 501.15, and 501.15(A)(4) shall apply to horizontal as well as to vertical boundaries of the defined hazardous (classified) locations.

**(5) Receptacles and Attachment Plugs.** Receptacles and attachment plugs located above hazardous (classified) anesthetizing locations shall be listed for hospital use for services of prescribed voltage, frequency, rating, and number of conductors with provision for the connection of the grounding conductor. This requirement shall apply to attachment plugs and receptacles of the 2-pole, 3-wire grounding type for single-phase, 120-volt, nominal, ac service.

Commented [CB34]: See FR 8783

**(6) 250-Volt Receptacles and Attachment Plugs Rated 50 and 60 Amperes.** Receptacles and attachment plugs rated 250 volts, for connection of 50-ampere and 60-ampere ac medical equipment for use above hazardous (classified) locations, shall be arranged so that the 60-ampere receptacle will accept either the 50-ampere or the 60-ampere plug. Fifty-ampere receptacles shall be designed so as not to accept the 60-ampere attachment plug. The attachment plugs shall be of the 2-pole, 3-wire design with a third contact connecting to the insulated (green or green with yellow stripe) equipment grounding conductor of the electrical system.

### (C) Other-Than-Hazardous (Classified) Anesthetizing Locations.

**(1) Wiring Methods.** Wiring serving other-than-hazardous (classified) locations, as defined in 517.60, shall be installed in a metal raceway system or cable assembly. The metal raceway system or cable armor or sheath assembly shall qualify as an equipment grounding conductor in accordance with 250.118. Type MC and Type MI cable shall have an outer metal armor, sheath, or sheath assembly that is identified as an acceptable equipment grounding conductor.

*Exception: Pendant receptacle installations that employ listed Type SJO or equivalent hard usage or extra-hard usage, flexible cords suspended not less than 1.8 m (6 ft) from the floor shall not be required to be installed in a metal raceway or cable assembly.*

Commented [CB35]: See FR 8705

**(2) Receptacles and Attachment Plugs.** Receptacles and attachment plugs installed and used in other-than-hazardous (classified) locations shall be listed "hospital grade" for services of prescribed voltage, frequency, rating, and number of conductors with provision for connection of the grounding conductor. This requirement shall apply to 2-pole, 3-wire grounding type for single-phase, 120-, 208-, or 240-volt, nominal, ac service.

Commented [CB36]: See FR 8787

**(3) 250-Volt Receptacles and Attachment Plugs Rated 50 Amperes and 60 Amperes.** Receptacles and attachment plugs rated 250 volts, for connection of 50-ampere and 60-ampere ac medical equipment for use in other-than-hazardous (classified) locations, shall be arranged so that the 60-ampere receptacle will accept either the 50-ampere or the 60-ampere plug. Fifty-ampere receptacles shall be designed so as not to accept the 60-ampere attachment plug. The attachment plugs shall be of the 2-pole, 3-wire design with a third contact connecting to the insulated (green or green with yellow stripe) equipment grounding conductor of the electrical system.

**517.62 Grounding.** In any anesthetizing area, all metal raceways and metal-sheathed cables and all normally non-current-carrying conductive portions of fixed electrical equipment shall be connected to an equipment grounding conductor. Grounding and bonding in Class I locations shall comply with 501.30.

*Exception: Equipment operating at not more than 10 volts between conductors shall not be required to be connected to an equipment grounding conductor.*

### **517.63 Grounded Power Systems in Anesthetizing Locations.**

**(A) Battery-Powered Lighting Units.** One or more battery-powered lighting units shall be provided and shall be permitted to be wired to the critical lighting circuit in the area and connected ahead of any local switches.

**(B) Branch-Circuit Wiring.** Branch circuits supplying only listed, fixed, therapeutic and diagnostic equipment, permanently installed above the hazardous (classified) location and in other-than-hazardous (classified) locations, shall be permitted to be supplied from a normal grounded service, single- or three-phase system, provided the following apply:

**Commented [CB37]:** See FR 8788 (Global)

- (1) Wiring for grounded and isolated circuits does not occupy the same raceway or cable.
- (2) All conductive surfaces of the equipment are connected to an equipment grounding conductor.
- (3) Equipment (except enclosed X-ray tubes and the leads to the tubes) is located at least 2.5 m (8 ft) above the floor or outside the anesthetizing location.
- (4) Switches for the grounded branch circuit are located outside the hazardous (classified) location.

*Exception: Sections 517.63(B)(3) and (B)(4) shall not apply in other-than-hazardous (classified) locations.*

**(C) Fixed Lighting Branch Circuits.** Branch circuits supplying only fixed lighting shall be permitted to be supplied by a normal grounded service, provided the following apply:

- (1) Such luminaires are located at least 2.5 m (8 ft) above the floor.
- (2) All conductive surfaces of luminaires are connected to an equipment grounding conductor.
- (3) Wiring for circuits supplying power to luminaires does not occupy the same raceway or cable for circuits supplying isolated power.
- (4) Switches are wall-mounted and located above hazardous (classified) locations.



*Exception: Sections 517.63(C)(1) and (C)(4) shall not apply in other-than-hazardous (classified) locations.*

**(D) Remote-Control Stations.** Wall-mounted remote-control stations for remote-control switches operating at 24 volts or less shall be permitted to be installed in any anesthetizing location.

**(E) Location of Isolated Power Systems.** Where an isolated power system is utilized, the isolated power equipment shall be listed as isolated power equipment. Isolated power system equipment and its supply circuit shall be permitted to be located in an anesthetizing location, provided it is installed above a hazardous (classified) location or in an other-than-hazardous (classified) location.

Commented [CB38]: See FR 8788 (Global)

**(F) Circuits in Anesthetizing Locations.** Except as permitted above, each power circuit within, or partially within, a flammable anesthetizing location as referred to in 517.60 shall be isolated from any distribution system supplying other-than-anesthetizing locations.

#### 517.64 Low-Voltage Equipment and Instruments.

**(A) Equipment Requirements.** Low-voltage equipment that is frequently in contact with the bodies of persons or has exposed current-carrying elements shall comply with one of the following:

- (1) Operate on an electrical potential of 10 volts or less
- (2) Be approved as intrinsically safe or double-insulated equipment
- (3) Be moisture resistant

**(B) Power Supplies.** Power shall be supplied to low-voltage equipment from one of the following:

- (1) An individual portable isolating transformer (autotransformers shall not be used) connected to an isolated power circuit receptacle by means of an appropriate cord and attachment plug
- (2) A common low-voltage isolating transformer installed in an other-than-hazardous (classified) location
- (3) Individual dry-cell batteries
- (4) Common batteries made up of storage cells located in an other-than-hazardous (classified) location

Commented [CB39]: See FR 8788 (Global)

Commented [CB40]: See FR 8788 (Global)

**(C) Isolated Circuits.** Isolating-type transformers for supplying low-voltage circuits shall have both of the following:

- (1) Approved means for insulating the secondary circuit from the primary circuit
- (2) The core and case connected to an equipment grounding conductor

**(D) Controls.** Resistance or impedance devices shall be permitted to control low-voltage equipment but shall not be used to limit the maximum available voltage to the equipment.

**(E) Battery-Powered Appliances.** Battery-powered appliances shall not be capable of being charged while in operation unless their charging circuitry incorporates an integral isolating-type transformer.

**(F) Receptacles or Attachment Plugs.** Any receptacle or attachment plug used on low-voltage circuits shall be of a type that does not permit interchangeable connection with circuits of higher voltage.

Informational Note: Any interruption of the circuit, even circuits as low as 10 volts, either by any switch or loose or defective connections anywhere in the circuit, may produce a spark that is sufficient to ignite flammable anesthetic agents.

## Part V. X-Ray Installations

**517.70 Applicability.** Nothing in this part shall be construed as specifying safeguards against the useful beam or stray X-ray radiation.

Informational Note No. 1: Radiation safety and performance requirements of several classes of X-ray equipment are regulated under Public Law 90-602 and are enforced by the Department of Health and Human Services.

Informational Note No. 2: In addition, information on radiation protection by the National Council on Radiation Protection and Measurements is published as *Reports of the National Council on Radiation Protection and Measurement*. These reports are obtainable from NCRP Publications, P.O. Box 30175, Washington, DC 20014.

**517.71 Connection to Supply Circuit.**

**(A) Fixed and Stationary Equipment.** Fixed and stationary X-ray equipment shall be connected to the power supply by means of a wiring method complying with applicable requirements of Chapters 1 through 4 of this *Code*, as modified by this article.

*Exception: Equipment properly supplied by a branch circuit rated at not over 30 amperes shall be permitted to be supplied through a suitable attachment plug and hard-service cable or cord.*

**(B) Portable, Mobile, and Transportable Equipment.** Individual branch circuits shall not be required for portable, mobile, and transportable medical X-ray equipment requiring a capacity of not over 60 amperes.

**(C) Over 1000-Volt Supply.** Circuits and equipment operated on a supply circuit of over 1000 volts shall comply with Article 490.

#### 517.72 Disconnecting Means.

**(A) Capacity.** A disconnecting means of adequate capacity for at least 50 percent of the input required for the momentary rating or 100 percent of the input required for the long-time rating of the X-ray equipment, whichever is greater, shall be provided in the supply circuit.

Commented [CB41]: See FR 8707

**(B) Location.** The disconnecting means shall be operable from a location readily accessible from the X-ray control.

**(C) Portable Equipment.** For equipment connected to a 120-volt branch circuit of 30 amperes or less, a grounding-type attachment plug and receptacle of proper rating shall be permitted to serve as a disconnecting means.

#### 517.73 Rating of Supply Conductors and Overcurrent Protection.

##### **(A) Diagnostic Equipment.**

**(1) Branch Circuits.** The ampacity of supply branch-circuit conductors and the current rating of overcurrent protective devices shall not be less than 50 percent of the momentary rating or 100 percent of the long-time rating, whichever is greater.

**(2) Feeders.** The ampacity of supply feeders and the current rating of overcurrent protective devices supplying two or more branch circuits

supplying X-ray units shall not be less than 50 percent of the momentary demand rating of the largest unit plus 25 percent of the momentary demand rating of the next largest unit plus 10 percent of the momentary demand rating of each additional unit. Where simultaneous biplane examinations are undertaken with the X-ray units, the supply conductors and overcurrent protective devices shall be 100 percent of the momentary demand rating of each X-ray unit.

Informational Note: The minimum conductor size for branch and feeder circuits is also governed by voltage regulation requirements. For a specific installation, the manufacturer usually specifies minimum distribution transformer and conductor sizes, rating of disconnecting means, and overcurrent protection.

**(B) Therapeutic Equipment.** The ampacity of conductors and rating of overcurrent protective devices shall not be less than 100 percent of the current rating of medical X-ray therapy equipment.

Informational Note: The ampacity of the branch-circuit conductors and the ratings of disconnecting means and overcurrent protection for X-ray equipment are usually designated by the manufacturer for the specific installation.

#### **517.74 Control Circuit Conductors.**

**(A) Number of Conductors in Raceway.** The number of control circuit conductors installed in a raceway shall be determined in accordance with 300.17.

**(B) Minimum Size of Conductors.** Size 18 AWG or 16 AWG fixture wires as specified in 725.49 and flexible cords shall be permitted for the control and operating circuits of X-ray and auxiliary equipment where protected by not larger than 20-ampere overcurrent devices.

**517.75 Equipment Installations.** All equipment for new X-ray installations and all used or reconditioned X-ray equipment moved to and reinstalled at a new location shall be of an approved type.

**517.76 Transformers and Capacitors.** Transformers and capacitors that are part of X-ray equipment shall not be required to comply with Articles 450 and 460.

Capacitors shall be mounted within enclosures of insulating material or grounded metal.

**517.77 Installation of High-Tension X-Ray Cables.** Cables with grounded shields connecting X-ray tubes and image intensifiers shall be permitted to be installed in cable trays or cable troughs along with X-ray equipment control and power supply conductors without the need for barriers to separate the wiring.

**517.78 Guarding and Grounding.**

**(A) High-Voltage Parts.** All high-voltage parts, including X-ray tubes, shall be mounted within grounded enclosures. Air, oil, gas, or other suitable insulating media shall be used to insulate the high-voltage from the grounded enclosure. The connection from the high-voltage equipment to X-ray tubes and other high-voltage components shall be made with high-voltage shielded cables.

**(B) Low-Voltage Cables.** Low-voltage cables connecting to oil-filled units that are not completely sealed, such as transformers, condensers, oil coolers, and high-voltage switches, shall have insulation of the oil-resistant type.

**(C) Non-Current-Carrying Metal Parts.** Non-current-carrying metal parts of X-ray and associated equipment (controls, tables, X-ray tube supports, transformer tanks, shielded cables, X-ray tube heads, etc.) shall be connected to an equipment grounding conductor in the manner specified in Part VII of Article 250, as modified by 517.13(A) and (B).

**Part VI. Communications, Signaling Systems, Data Systems, Fire Alarm Systems, and Systems Less Than 120 Volts, Nominal**

**517.80 Patient Care Spaces.** Equivalent insulation and isolation to that required for the electrical distribution systems in patient care areas shall be provided for communications, signaling systems, data system circuits, fire alarm systems, and systems less than 120 volts, nominal.

Class 2 and Class 3 signaling and communications systems and power-limited fire alarm systems shall not be required to comply with the grounding requirements of 517.13, to comply with the mechanical protection requirements of 517.31(C)(3)(5), or to be enclosed in raceways, unless otherwise specified by Chapter 7 or 8.

Secondary circuits of transformer-powered communications or signaling systems shall not be required to be enclosed in raceways unless otherwise specified by Chapter 7 or 8. [~~99: 6.4.2.2.6.66.7.2.3.7~~]

**517.81 Other-Than-Patient-Care Areas.** In other-than-patient-care areas, installations shall be in accordance with the applicable provisions of other parts of this Code.

Commented [CB42]: See FR 8702

### **517.82 Signal Transmission Between Appliances.**

**(A) General.** Permanently installed signal cabling from an appliance in a patient location to remote appliances shall employ a signal transmission system that prevents hazardous grounding interconnection of the appliances.

Informational Note: See 517.13(A) for additional grounding requirements in patient care ~~areasspaces~~.

**(B) Common Signal Grounding Wire.** Common signal grounding wires (i.e., the chassis ground for single-ended transmission) shall be permitted to be used between appliances all located within the patient care vicinity, provided the appliances are served from the same reference grounding point.

## **Part VII. Isolated Power Systems**

### **517.160 Isolated Power Systems.**

#### **(A) Installations.**

**(1) Isolated Power Circuits.** Each isolated power circuit shall be controlled by a switch or circuit breaker that has a disconnecting pole in each isolated circuit conductor to simultaneously disconnect all power. Such isolation shall be accomplished by means of one or more isolation transformers, by means of generator sets, or by means of electrically isolated batteries. Conductors of isolated power circuits shall not be installed in cables, raceways, or other enclosures containing conductors of another system.

#### **(2) Circuit Characteristics.**

Circuits supplying primaries of isolating transformers shall operate at not more than 600 volts between conductors and shall be provided with proper overcurrent protection. The secondary voltage of such transformers shall not exceed 600 volts between conductors of each circuit. All circuits supplied from such secondaries shall be ungrounded and shall have an approved overcurrent device of proper ratings in each conductor. Circuits supplied directly from batteries or from motor generator sets shall be ungrounded and shall be protected against overcurrent in the same manner as transformer-fed secondary circuits. If an electrostatic shield is present, it shall be connected to the reference grounding point. ~~[99:6.3.2.6.1]~~

**(3) Equipment Location.** The isolating transformers, motor generator sets, batteries and battery chargers, and associated primary or secondary overcurrent devices shall not be installed in hazardous (classified) locations. The isolated secondary circuit wiring extending into a hazardous anesthetizing location shall be installed in accordance with 501.10.

**(4) Isolation Transformers.** An isolation transformer shall not serve more than one operating room except as covered in (A)(4)(a) and (A)(4)(b).

For purposes of this section, anesthetic induction rooms are considered part of the operating room or rooms served by the induction rooms.

- (a) *Induction Rooms.* Where an induction room serves more than one operating room, the isolated circuits of the induction room shall be permitted to be supplied from the isolation transformer of any one of the operating rooms served by that induction room.
- (b) *Higher Voltages.* Isolation transformers shall be permitted to serve single receptacles in several patient areas where the following apply:
  - (1) The receptacles are reserved for supplying power to equipment requiring 150 volts or higher, such as portable X-ray units.
  - (2) The receptacles and mating plugs are not interchangeable with the receptacles on the local isolated power system.

~~[99:13.4.1.2.6.6]~~

**(5) Conductor Identification.** The isolated circuit conductors shall be identified as follows:

- (1) Isolated Conductor No. 1 — Orange with at least one distinctive colored stripe other than white, green, or gray along the entire length of the conductor
- (2) Isolated Conductor No. 2 — Brown with at least one distinctive colored stripe other than white, green, or gray along the entire length of the conductor

For 3-phase systems, the third conductor shall be identified as yellow with at least one distinctive colored stripe other than white, green, or gray along the entire length of the conductor. Where isolated circuit conductors supply 125-volt, single-phase, 15- and 20-ampere receptacles, the striped orange conductor(s) shall be connected to the terminal(s) on the receptacles that are identified in accordance with 200.10(B) for connection to the grounded circuit conductor.

**(6) Wire-Pulling Compounds.** Wire-pulling compounds that increase the dielectric constant shall not be used on the secondary conductors of the isolated power supply.

Informational Note No. 1: It is desirable to limit the size of the isolation transformer to 10 kVA or less and to use conductor insulation with low leakage to meet impedance requirements.

Informational Note No. 2: Minimizing the length of branch-circuit conductors and using conductor insulations with a dielectric constant less than 3.5 and insulation resistance constant greater than 6100 megohm-meters (20,000 megohm-feet) at 16°C (60°F) reduces leakage from line to ground, reducing the hazard current.

#### **(B) Line Isolation Monitor.**

**(1) Characteristics.** In addition to the usual control and overcurrent protective devices, each isolated power system shall be provided with a listed continually operating line isolation monitor that indicates total hazard current. The monitor shall be designed such that a green signal lamp, conspicuously visible to persons in each area served by the isolated power system, remains lighted when the system is adequately isolated from ground. An adjacent red signal lamp and an audible warning signal (remote if desired) shall be energized when the total hazard current (consisting of possible resistive and capacitive leakage currents) from either isolated conductor to ground reaches a threshold value of 5 mA under nominal line voltage conditions. The line monitor shall not alarm for a fault hazard of less than 3.7 mA or for a total hazard current of less than 5 mA.



*Exception: A system shall be permitted to be designed to operate at a lower threshold value of total hazard current. A line isolation monitor for such a system shall be permitted to be approved, with the provision that the fault hazard current shall be permitted to be reduced but not to less than 35 percent of the corresponding threshold value of the total hazard current, and the monitor hazard current is to be correspondingly reduced to not more than 50 percent of the alarm threshold value of the total hazard current.*

**(2) Impedance.** The line isolation monitor shall be designed to have sufficient internal impedance such that, when properly connected to the isolated system, the maximum internal current that can flow through the line isolation monitor, when any point of the isolated system is grounded, shall be 1 mA.

*Exception: The line isolation monitor shall be permitted to be of the low-impedance type such that the current through the line isolation monitor, when any point of the isolated system is grounded, will not exceed twice the alarm threshold value for a period not exceeding 5 milliseconds.*

Informational Note: Reduction of the monitor hazard current, provided this reduction results in an increased "not alarm" threshold value for the fault hazard current, will increase circuit capacity.

**(3) Ammeter.** An ammeter calibrated in the total hazard current of the system (contribution of the fault hazard current plus monitor hazard current) shall be mounted in a plainly visible place on the line isolation monitor with the "alarm on" zone at approximately the center of the scale.

*Exception: The line isolation monitor shall be permitted to be a composite unit, with a sensing section cabled to a separate display panel section on which the alarm or test functions are located.*

Informational Note: It is desirable to locate the ammeter so that it is conspicuously visible to persons in the anesthetizing location.

**First Revision No. 8823-NFPA 70-2018 [ New Section after 518.5 ]****518.6 Illumination.**

Illumination shall be provided for all working spaces about fixed service equipment, switchboards, switchgear, panelboards, or motor control centers installed outdoors that serve assembly occupancies. Control by automatic means only shall not be permitted. Additional lighting outlets shall not be required where the workspace is illuminated by an adjacent light source.

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submittal Date:** Fri Jan 19 13:21:15 EST 2018

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Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** In assembly occupancies, fixed service equipment is often installed outdoors. Unlike indoor service equipment, where illumination is required by 110.26(D), this outdoor equipment has no such illumination requirement. Due to the large number of people affected in assembly occupancies, illumination of this outdoor equipment will provide an increase in safety and speed of safe access for maintenance personnel

**Response Message:**

Public Input No. 3164-NFPA 70-2017 [New Section after 518.5]

**First Revision No. 8699-NFPA 70-2018 [ Section No. 517.1 ]****517.1 Scope.**

~~The provisions of this article shall apply.~~ This article applies to electrical construction and installation criteria in health care facilities that provide services to human beings.

The requirements in Parts II and III not only apply to single-function buildings but are also intended to be individually applied to their respective forms of occupancy within a multifunction building (e.g., a doctor's examining room located within a limited care facility would be required to meet the provisions of 517.10).

Informational Note: For information concerning performance, maintenance, and testing criteria, refer to the appropriate health care facilities documents.

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

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**Submittal Date:** Thu Jan 18 13:18:22 EST 2018

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Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** These changes are necessary to align the text with the NEC style manual.

**Response Message:**

**First Revision No. 8662-NFPA 70-2018 [ Section No. 517.10(B) ]**

**(B)** Not Covered.

Part II shall not apply to the following:

- (1) Business offices, corridors, waiting rooms, and the like in clinics, medical and dental offices, and outpatient facilities
- (2) Areas of nursing homes and limited care facilities wired in accordance with Chapters 1 through 4 of this *Code* where these areas are used exclusively as patient sleeping rooms
- (3) Areas used exclusively for any of the following purposes:
  - a. Intramuscular Injections (Immunizations)
  - b. Psychiatry and Psychotherapy
  - c. Alternative Medicine
  - d. Optometry

Informational Note: See NFPA 101-2015 2018, *Life Safety Code*®.

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

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**Submittal Date:** Thu Jan 18 09:55:18 EST 2018

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**Committee Statement and Meeting Notes**

**Committee Statement:** The panel sees value in further defining the spaces where Part II shall not apply.

The reference in the informational note was updated.

**Response Message:**

Public Input No. 1694-NFPA 70-2017 [Section No. 517.10(B)]

**First Revision No. 8700-NFPA 70-2018 [ Section No. 517.12 ]****517.12** Wiring Methods.

Except as modified in this article, wiring methods shall comply with ~~the applicable provisions of~~ Chapters 1 through 4 of this Code.

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submission Date:** Thu Jan 18 13:21:00 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes****Committee Statement:** This change is necessary to align the text with the NEC style manual.**Response Message:**

FOR CODE-MAKING PANEL USE ONLY  
SUBJECT TO REVISION - NOT FOR PUBLICATION

**First Revision No. 8666-NFPA 70-2018 [ Section No. 517.13 ]****517.13- 13** Equipment Grounding of Conductor for Receptacles and Fixed Electrical Equipment in Patient Care Spaces.

Wiring in patient care spaces shall comply with 517.13(A) and (B).

**(A) Wiring Methods.**

All branch circuits serving patient care spaces shall be provided with an effective ground-fault current path by installation in a metal raceway system or a cable having a metallic armor or sheath assembly. The metal raceway system, metallic cable armor, or sheath assembly shall itself qualify as an equipment grounding conductor in accordance with 250.118.

**(B) Insulated Equipment Grounding Conductors and Insulated Equipment Bonding Jumpers.****(1) General.**

The following shall be directly connected to an insulated copper equipment grounding conductor that is clearly identified along its entire length by green insulation and installed with the branch circuit conductors in the wiring methods as provided in 517.13(A):

- (1) The grounding terminals of all receptacles other than isolated ground receptacles
- (2) Metal outlet boxes, metal device boxes, or metal enclosures
- (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
- (4) Metal faceplates shall be connected to the equipment grounding conductor by means of a metal mounting screw(s) securing the faceplate to a metal yoke or strap of a receptacle or to a metal outlet box.

*Exception No. 1: For other than isolated ground receptacles, 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. Isolated ground receptacles shall be connected in accordance with .*

Exception No.

~~2: Metal faceplates shall be permitted to be connected to the equipment grounding conductor by means of a metal mounting screw(s) securing the faceplate to a grounded outlet box or grounded wiring device. Exception No. 3:~~

2: Luminaires more than 2.3 m (7 1/2 ft) above the floor and switches located outside of the patient care vicinity shall be permitted to be connected to an equipment grounding return path complying with 517.13(A) or (B).

**(2) Sizing.**

Equipment grounding conductors and equipment bonding jumpers shall be sized in accordance with 250.122 .

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

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**Submittal Date:** Thu Jan 18 10:16:50 EST 2018

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**Committee Statement and Meeting Notes**

WORKING DRAFT OF CMP MEETING OUTPUT - NATIONAL ELECTRICAL CODE - NFPA 70  
JANUARY 8 - 20, 2018 - SUBJECT TO REVISION - NOT FOR PUBLICATION

**Committee Statement:** The revised title clarifies that this section is addressing the equipment grounding conductor installation as outlined in 250.118. Revising Exception No. 2 and moving it to a subsection of 517.13 adds clarity for users and coordinates with 406.6.

**Response Message:**

**Committee Notes:**

<u>Date</u>	<u>Submitted By</u>
Jan 18, 2018	NEC-CMP Panel No change in Exceptions, except to delete No. 2. 15 No change in (B)(2).

Public Input No. 2010-NFPA 70-2017 [Section No. 517.13]

FOR CODE-MAKING PANEL USE ONLY  
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## First Revision No. 8670-NFPA 70-2018 [ Section No. 517.16 ]

### 517.16 Use of Isolated Ground Receptacles.

An isolated ground receptacle, if used, shall not defeat the purposes of the safety features of the grounding systems detailed in 517.13. [99:6.3.2.2.5 (A) ]

#### (A) Inside of a Patient Care Vicinity.

An isolated grounding receptacle shall not be installed within a patient care vicinity. [99:6.3.2.2.7.4 5 (B)]

#### (B) Outside of a Patient Care Vicinity.

Isolated ground receptacle(s) installed in patient care spaces outside of a patient care vicinity(s) shall comply with 517.16(B)(1) and (2).

#### (1)

The equipment grounding terminals of isolated ground receptacles installed in branch circuits for patient care spaces shall be connected to an insulated equipment grounding conductor in accordance with 250.146(D) ~~in addition to the equipment grounding conductor path required~~ installed in a wiring method described in 517.13(A).

The equipment grounding conductor connected to the equipment grounding terminals of isolated ground receptacles in patient care spaces shall be clearly identified along the equipment grounding conductor's entire length by green insulation with one or more yellow stripes.

#### (2)

The insulated equipment grounding conductor required in 517.13(B)(1) shall be clearly identified along its entire length by green insulation, with no yellow stripes, and shall not be connected to the grounding terminals of isolated equipment ground receptacles but shall be connected to the box or enclosure indicated in 517.13(B)(1)(2) and to non-current-carrying conductive surfaces of fixed electrical equipment indicated in 517.13(B)(1)(3).

Informational Note No. 1: This type of installation is typically used where a reduction of electrical noise (electromagnetic interference) is necessary, and parallel grounding paths are to be avoided.

Informational Note No. 2: Care should be taken in specifying a system containing isolated ground receptacles, because the grounding impedance is controlled only by the grounding wires ~~impedance of the effective ground-fault current path is dependent upon the equipment grounding conductor(s) and does not benefit from any conduit or building structure in parallel with the equipment grounding path.~~ [ 99: A.6.3.2.2.7.4 ] conductor.

## Submitter Information Verification

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

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**Submittal Date:** Thu Jan 18 10:42:05 EST 2018

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Based on Committee Text

## Committee Statement and Meeting Notes

**Committee Statement:** The changes to this section provide better explanation of use of isolated receptacles outside the patient care vicinity. It is the clear intent of this section that both grounding methods required in 517.13 be present in wiring methods used for isolated grounding receptacles. In addition, a separate equipment grounding conductor using a green insulation with a yellow stripe shall be connected to the equipment



grounding terminal of the isolated grounding receptacle terminal.

**Response****Message:**

[Public Input No. 2401-NFPA 70-2017 \[Section No. 517.16\(B\)\]](#)

[Public Input No. 1514-NFPA 70-2017 \[Section No. 517.16\(B\)\(2\)\]](#)

[Public Input No. 464-NFPA 70-2017 \[Section No. 517.16\]](#)

[Public Input No. 2895-NFPA 70-2017 \[Section No. 517.16\(B\)\(1\)\]](#)

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SUBJECT TO REVISION - NOT FOR PUBLICATION



## First Revision No. 8681-NFPA 70-2018 [ Section No. 517.17(A) ]

### (A) Applicability.

The requirements of 517.17 shall apply to hospitals, and other buildings (including multiple-occupancy buildings) with critical care (Category 1 buildings or portions of buildings containing healthcare facilities with Category 1 (critical care) spaces or utilizing electrical life-support equipment, and buildings that provide the required essential utilities or services for the operation of Category 1 (critical care- (Category 1) spaces or electrical life-support equipment.

### Submitter Information Verification

**Submitter Full Name:** NEC-CMP Panel 15

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**State:**

**Zip:**

**Submission Date:** Thu Jan 18 11:13:40 EST 2018

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Based on Committee  
Text

### Committee Statement and Meeting Notes

**Committee Statement:** The application of codes and standards to health care facilities should be based on the risk considerations of Category 1 (critical care) rather than the occupancy of the building. The panel notes, with the addition of "building or portions of building containing...", that these risk categories can be found in any structure supporting health care operations.

In response to the Correlating Committee Public Comment 1813 in the 2017 cycle and in accordance with 4.3.3 of the NEC Style manual and 2.3.2.11 of the Manual of Style for NFPA Technical Committee Documents, permission was sought and obtained from HEA-FUN to use parenthetical references between specific older and current NFPA 99 terminology in the NEC as a transition. For 2020 NEC®, CMP 15 modifies the use of transitional terminology as follows: "Category 1 Space (Critical Care Space)", "Category 2 Space (General Care Space)", "Category 3 Space (Basic Care Space)", and "Category 3 Space (Support Space)".

**Response Message:**

Public Input No. 3773-NFPA 70-2017 [Section No. 517.17(A)]

**First Revision No. 8701-NFPA 70-2018 [ Section No. 517.17(B) ]****(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 on the load side of an essential electrical system transfer switch.

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submittal Date:** Thu Jan 18 13:22:08 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes****Committee Statement:** This change is necessary to align the text with the NEC style manual.**Response Message:**



## First Revision No. 8685-NFPA 70-2018 [ Section No. 517.17(D) ]

### (D) Testing.

When equipment ground-fault protection is first installed, each level shall be performance tested to ensure compliance with 517.17(C). This testing shall be conducted by a qualified person(s) using a test process in accordance with the instruction provided with the equipment. A written record of this testing shall be made and shall be available to the authority having jurisdiction.

### Submitter Information Verification

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Thu Jan 18 11:22:44 EST 2018

### Committee Statement and Meeting Notes

**Committee Statement:** This revision provides clarity by requiring qualified persons perform a test process of primary current injection. This correlates with the testing requirements in 230.95(C).

**Response Message:**

Public Input No. 3437-NFPA 70-2017 [Section No. 517.17(D)]

FOR CODE-MAKING PANEL USE ONLY  
SUBJECT TO REVISION - NOT FOR PUBLICATION

**First Revision No. 8688-NFPA 70-2018 [ Section No. 517.18(A) ]****(A) Patient Bed Location.**

Each patient bed location shall be supplied by at least two branch circuits, one from the critical branch and one from the normal system. All branch circuits from the normal system shall originate in the same panelboard. The electrical receptacles or the cover plate for the electrical receptacles supplied from the critical branch shall have a distinctive color or marking so as to be readily identifiable and shall also indicate the panelboard and branch-circuit number supplying them.

Branch circuits serving patient bed locations shall not be part of a multiwire branch circuit.

*Exception No. 1: Branch circuits serving only special purpose outlets or receptacles, such as portable X-ray outlets, shall not be required to be served from the same distribution panel or panels.*

*Exception No. 2: The requirements of 517.18(A) shall not apply to patient bed locations in clinics, medical and dental offices, and outpatient facilities; psychiatric, substance abuse, and rehabilitation hospitals; sleeping rooms of nursing homes; and limited care facilities meeting the requirements of 517.10(B)(2).*

*Exception No. 3: A Category 2 ( ~~general care~~ ( ~~Category 2~~ ) patient bed location served from two separate transfer switches on the critical branch shall not be required to have circuits from the normal system.*

*Exception No. 4: Circuits served by Type 2 essential electrical systems shall be permitted to be fed by the equipment branch of the essential electrical system.*

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submission Date:** Thu Jan 18 11:37:24 EST 2018

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**Committee Statement and Meeting Notes**

**Committee Statement:** NFPA 99-2015 Section 6.3.2.2.10.2 allows Category 2 Spaces to be served by a Type 1 or Type 2 EES. Per Section 6.5.2.2.1.2, Type 2 EES consists of the Life Safety and Equipment Branch. Therefore, a new exception was added to meet the intent without removing the term "critical branch," which is important for clarity in the NEC. The panel notes 517.44(A)(1) permits these types of configurations.

In response to the Correlating Committee Public Comment 1813 in the 2017 cycle and in accordance with 4.3.3 of the NEC Style manual and 2.3.2.11 of the Manual of Style for NFPA Technical Committee Documents, permission was sought and obtained from HEA-FUN to use parenthetical references between specific older and current NFPA 99 terminology in the NEC as a transition. In the 2017 edition of the NEC, transitional terminology was used as follows: "Critical Care Space (Category 1 Space)", "General Care Space (Category 2 Space)", "Basic Care Space (Category 3 Space)", and "Support Space (Category 4 Space)".

**Response Message:**

[Public Input No. 3811-NFPA 70-2017 \[Section No. 517.18\(A\)\]](#)

**First Revision No. 8690-NFPA 70-2018 [ Section No. 517.18(B) ]****(B) Patient Bed Location Receptacles.**

(1) Minimum Number and Supply. Each patient bed location shall be provided with a minimum of eight receptacles.- They

(2) Receptacle Requirements. The receptacles required in 517.18(B)(1) shall be permitted to be of the single, duplex, or quadruplex type or any combination of the three. All receptacles shall be listed "hospital grade" and shall be so identified. The grounding terminal of each receptacle shall be connected to an insulated copper equipment grounding conductor sized in accordance with Table 250.122.

*Exception No. 1: The requirements of 517.18(B) shall not apply to psychiatric, substance abuse, and rehabilitation hospitals meeting the requirements of 517.10(B)(2).*

*Exception No. 2: Psychiatric security rooms shall not be required to have receptacle outlets installed in the room.*

Informational Note: It is not intended that there be a total, immediate replacement of existing non-hospital grade receptacles. It is intended, however, that non-hospital grade receptacles be replaced with hospital grade receptacles upon modification of use, renovation, or as existing receptacles need replacement.

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Thu Jan 18 11:45:33 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** This revision is editorial in nature and provides clarity.

**Response Message:**

Public Input No. 3776-NFPA 70-2017 [Section No. 517.18(B)]

**First Revision No. 8697-NFPA 70-2018 [ Section No. 517.19(G) ]****(G) Isolated Power System Equipment Grounding.**

Where an isolated ungrounded power source is used and limits the first-fault current to a low magnitude, the equipment grounding conductor associated with the secondary circuit shall be permitted to be run outside of the enclosure of the power conductors in the same circuit.

Informational Note: Although it is permitted to run the equipment grounding conductor outside of the conduit, it is safer to run it with the power conductors to provide better protection in case of a second ground fault.

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submittal Date:** Thu Jan 18 13:13:08 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** The term “grounding conductor” is one that is no longer defined. As part of a Correlating Committee Task Force activity on grounding and bonding in general, this term and its related definition was removed from the NEC during the 2008 NEC cycle. The term had been found to be misapplied in many instances and the definition of “grounding conductor” was determined to be very close to the definition of “grounding electrode conductor” yet, many uses of the term in previous editions of the NEC were found to be more correctly to be either “equipment grounding conductor” and has been corrected in with this revision.

**Response Message:**

[Public Input No. 2402-NFPA 70-2017 \[Section No. 517.19\(G\)\]](#)

**First Revision No. 8698-NFPA 70-2018 [ Section No. 517.19(H) ]****(H) Special-Purpose Receptacle Grounding.**

The equipment grounding conductor for special-purpose receptacles, such as the operation of mobile X-ray equipment, shall be extended to the reference grounding points of branch circuits for all locations likely to be served from such receptacles. Where such a circuit is served from an isolated ungrounded system, the equipment grounding conductor shall not be required to be run with the power conductors; however, the equipment grounding terminal of the special-purpose receptacle shall be connected to the reference grounding point.

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submittal Date:** Thu Jan 18 13:16:26 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** The term "grounding conductor" is one that is no longer defined. As part of a Correlating Committee Task Force activity on grounding and bonding in general, this term and its related definition was removed from the NEC during the 2008 NEC cycle. The term had been found to be misapplied in many instances and the definition of "grounding conductor" was determined to be very close to the definition of "grounding electrode conductor" yet, many uses of the term in previous editions of the NEC were found to be more correctly to be either "equipment grounding conductor" and has been corrected in with this revision.

**Response Message:**

[Public Input No. 2403-NFPA 70-2017 \[Section No. 517.19\(H\)\]](#)



**First Revision No. 8796-NFPA 70-2018 [ Section No. 517.21 ]****517.21** Ground-Fault Circuit-Interrupter Protection for Personnel.

Ground-fault circuit-interrupter protection for personnel shall not be required for receptacles installed in those Category 1 ( ~~critical care- (Category 4)~~ ) spaces where the toilet and basin are installed within the patient room.

Informational Note: UL 943-2016 Ground-Fault Circuit-Interrupters, Annex E, indicates that listed ground-fault circuit interrupters should not be used on circuits connected to life-support equipment.

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submittal Date:** Fri Jan 19 11:04:10 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** In response to the Correlating Committee Public Comment 1813 in the 2017 cycle and in accordance with 4.3.3 of the NEC Style manual and 2.3.2.11 of the Manual of Style for NFPA Technical Committee Documents, permission was sought and obtained from HEA-FUN to use parenthetical references between specific older and current NFPA 99 terminology in the NEC as a transition. For 2020 NEC®, CMP 15 modifies the use of transitional terminology as follows: "Category 1 Space (Critical Care Space)", "Category 2 Space (General Care Space)", "Category 3 Space (Basic Care Space)", and "Category 3 Space (Support Space)".

Informational Note added to reflect ANSI/UL943 Clause 8.1.2 and Annex E restriction, mandated by U.S. CPSC (and Health Canada) and consequently by the UL and CSA Standard, to not install GFCIs on circuits that power life-support equipment.

**Response  
Message:**

**First Revision No. 8712-NFPA 70-2018 [ Section No. 517.25 ]****517.25 Scope.**

The essential electrical system (EES) for these facilities shall comprise a system capable of supplying a limited amount of lighting and power service, which is considered essential for life safety and orderly cessation of procedures during the time normal electrical service is interrupted for any reason. This includes clinics, medical and dental offices, outpatient facilities, nursing homes, limited care facilities, hospitals, and other health care facilities serving patients.

Informational Note: For information on the need for an essential electrical system, see NFPA 99-2015 2018, *Health Care Facilities Code*.

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

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**Submittal Date:** Thu Jan 18 13:51:29 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** The referenced standard is updated to the current edition.

**Response Message:**



## First Revision No. 8713-NFPA 70-2018 [ Section No. 517.26 ]

### 517.26 Application of Other Articles.

The life safety branch of the essential electrical system shall meet the requirements of Article 700, except as amended by Article 517.

(A) The following portions of Article 700 shall be amended as follows:

(1) 700.4 shall not apply.

(2) 700.10(D)(1) through (3) shall not apply.

(3) 700.17 Branch Circuits for Emergency Lighting. Branch Circuits that supply emergency lighting shall be installed to provide service from a source complying with 700.12 when normal supply for lighting is interrupted or where single circuits supply luminaires containing secondary batteries.

(4) 700.32 shall not apply.

[99:6.7.5.1.2.2]

Informational Note No. 1: For additional information, see NFPA 110-2013 2016 , *Standard for Emergency and Standby Power Systems*.

Informational Note No. 2: For additional information, see ~~and NFPA~~ and NFPA 99-2015 2018 , *Health Care Facilities Code*.

### Submitter Information Verification

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submission Date:** Thu Jan 18 13:54:08 EST 2018

Make Editorial Changes  
Based on Committee Text

### Committee Statement and Meeting Notes

**Committee Statement:** Extracted material inserted from NFPA 99 – 2018 Section 6.7.5.1.2.2 will improve the correlation between NFPA 99 and NFPA 70. The proposed addition is the result of the 99 HEA-ELS TC agreeing that the life safety branch is required to conform to Article 700 except for several performance requirements as listed.

Editorial change to reference use of NFPA 99-2015, Health Care Facilities Code to NFPA 99-2018, Health Care Facilities Code and NFPA 101-2015, Life Safety Code to NFPA 101-2018, Life Safety Code.

**Response Message:**

Public Input No. 3818-NFPA 70-2017 [Section No. 517.26]

**First Revision No. 8714-NFPA 70-2018 [ Section No. 517.29 ]**

**517.29- 29** ~~Type 1 Essential Electrical Systems- for Hospitals and Other Health Care Facilities.~~ [SEE ATTACHMENT FOR FINAL REVISIONS]

**(A)** Applicability.

The requirements of Part III, 517.29 through 517.30 ~~35~~, shall apply to Type 1 systems. Type 1 systems shall be required for Category 1 (critical care- (Category 4 ) and Category 2 ( general care- (Category 2 ) hospitals and other health care facilities using Type 1 essential electrical systems where patients are sustained by electrical life-support equipment.

Informational Note No. 1: For performance, maintenance, and testing requirements of essential electrical systems in hospitals, see NFPA 99-2015 2018, *Health Care Facilities Code*. For installation of centrifugal fire pumps, see NFPA 20-2013 2016, *Standard for the Installation of Stationary Pumps for Fire Protection*.

Informational Note No. 2: For additional information on Type 1 and Type 2 essential electrical systems, see NFPA 99-2015 2018, *Health Care Facilities Code*, 6.7.5 and 6.7.6.

**(B)**

~~Critical care ( Category 1 (critical care ) spaces shall be served only by a Type 1 essential electrical system EES . [99:6.3.2.2.10. 4. 1]~~

**Supplemental Information**

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
70_FR8714_517.29.docx	For staff use	✓

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Thu Jan 18 13:57:52 EST 2018

Make Editorial Changes  
Based on Committee Text

**Committee Statement and Meeting Notes**

**Committee Statement:** The revised language correlates NFPA 99 Type 1 language with the Section 517. Two new informational notes have been added to provide Code users information on Type 1 and Type 2 essential electrical systems.

Editorial changes to correlate NFPA 99-2018, Health Care Facilities Code and NFPA 20-2016, Standard for the Installation of Stationary Pumps for Fire Protection as well as the NFPA 99 extracted text reference to 517.29(B).

In response to the Correlating Committee Public Comment 1813 in the 2017 cycle and in accordance with 4.3.3 of the NEC Style manual and 2.3.2.11 of the Manual of Style for NFPA Technical Committee Documents, permission was sought and obtained from HEA-FUN to use parenthetic references between specific older and current NFPA 99 terminology in the NEC as a transition. For 2020 NEC®, CMP 15 modifies the use of transitional terminology as follows: "Category 1 Space (Critical Care Space)", "Category 2 Space (General Care Space)", "Category 3 Space (Basic Care Space)", and "Category 3

Space (Support Space)".

**Response**

**Message:**

[Public Input No. 3819-NFPA 70-2017 \[Section No. 517.29\(B\)\]](#)

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## First Revision No. 8723-NFPA 70-2018 [ Section No. 517.30(C) ]

### (C) Location of Essential Electrical System Components. SEE ATTACHED FOR CHANGES

Essential electrical system components shall be located to minimize interruptions caused by natural forces common to the area (e.g., storms, floods, earthquakes, or hazards created by adjoining structures or activities). Installations of electrical services shall be located to reduce possible interruption of normal electrical services resulting from similar causes as well as possible disruption of normal electrical service due to internal wiring and equipment failures. Feeders shall be located to provide physical separation of the feeders of the alternate source and from the feeders of the normal electrical source to prevent possible simultaneous interruption.

Informational Note: Facilities in which the normal source of power is supplied by two or more separate central station-fed services experience greater than normal electrical service reliability than those with only a single feed. Such a dual source of normal power consists of two or more electrical services fed from separate generator sets or a utility distribution network that has multiple power input sources and is arranged to provide mechanical and electrical separation so that a fault between the facility and the generating sources is not likely to cause an interruption of more than one of the facility service feeders.

### Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
70_FR8723_517.30_C_.docx	For staff use	✓

### Submitter Information Verification

**Submitter Full Name:** NEC-CMP Panel 15  
**Organization:** [ Not Specified ]  
**Street Address:**  
**City:**  
**State:**  
**Zip:**  
**Submittal Date:** Thu Jan 18 15:23:44 EST 2018

Make Editorial Changes  
Based on Committee  
Text

### Committee Statement and Meeting Notes

**Committee Statement:** This revision adds extracted material from NFPA 99. Service and Feeder conductors arranged to provide mechanical and electrical separation provide added safety so that a fault between the facility and the generating sources is not likely to cause an interruption of more than one of the facility service feeders.

**Response Message:**

Public Input No. 407-NFPA 70-2017 [Section No. 517.30(C)]

**First Revision No. 8732-NFPA 70-2018 [ Section No. 517.31(A) ]****(A) Separate Branches.**

Type 1 Essential electrical systems for hospitals shall be comprised of three separate branches capable of supplying a limited amount of lighting and power service that is considered essential for life safety and effective hospital operation during the time the normal electrical service is interrupted for any reason. The three branches are life safety, critical, and equipment.

The division between the branches shall occur at transfer switches where more than one transfer switch is required [99:6.4 7 .2.2 3 .1-2 ]

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submittal Date:** Thu Jan 18 15:55:27 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** NFPA 99 defines facilities that require a Type 1 EES and the risk present in the facility.

The extracted references from NFPA 99-2015 to NFPA 99-2018 HCFC were also updated and changed.

**Response Message:**

Public Input No. 3820-NFPA 70-2017 [Section No. 517.31(A)]



**First Revision No. 8740-NFPA 70-2018 [ Section No. 517.31(B) [Excluding any Sub-Sections] ]**

The number of transfer switches to be used shall be based on reliability and design. Each branch of the essential electrical system shall have one or more transfer switches.

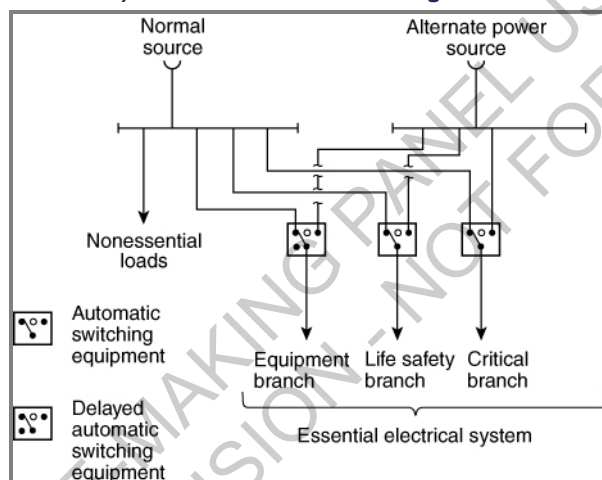
One transfer switch and downstream distribution system shall be permitted to serve one or more branches in a facility with a maximum demand on the essential electrical system of 150 kVA.

Informational Note No. 1: See NFPA 99-2015 2018, *Health Care Facilities Code*, 6.4.7.3.2.1, Transfer Switches; 6.4.7.2.4.2.5, Automatic Transfer Switch Features; 6.4.7.2.4.2.5.15, Nonautomatic Transfer Switch Features; and 6.4.7.2.4.2.7, Nonautomatic Transfer Device Features.

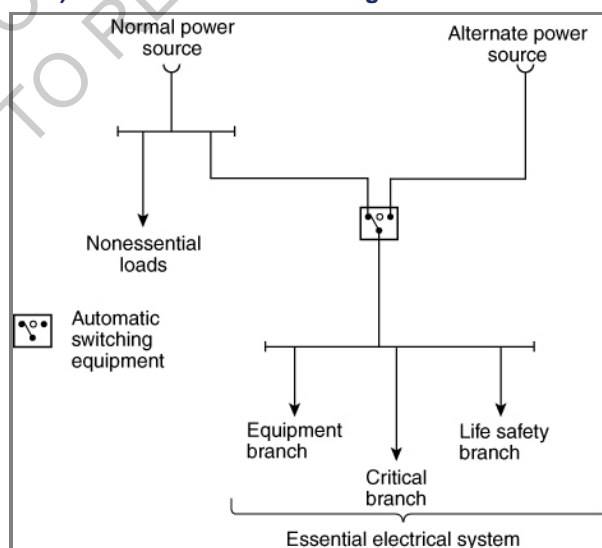
Informational Note No. 2: See Informational Note Figure 517.31(a).

Informational Note No. 3: See Informational Note Figure 517.31(b).

**Figure Informational Note Figure 517.31(a) Hospital Type 1 Essential Electrical System — Minimum Requirement (greater than 150 kVA) for Transfer Switch Arrangement.**



**Figure Informational Note Figure 517.31(b) Hospital Type 1 Essential Electrical System — Minimum Requirement (150 kVA or less) for Transfer Switch Arrangement.**



**Submitter Information Verification**



**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Thu Jan 18 16:27:04 EST 2018

Make Editorial Changes  
Based on Committee Text

### Committee Statement and Meeting Notes

**Committee Statement:** NFPA 99 defines which facilities need to be provided with a Type 1 EES, based on the risk to the patient present in the facility.

The references to NFPA 99 have been updated.

**Response Message:**

Public Input No. 3821-NFPA 70-2017 [Section No. 517.31(B) [Excluding any Sub-Sections]]

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SUBJECT TO REVISION - NOT FOR PUBLICATION

**First Revision No. 8772-NFPA 70-2018 [ Section No. 517.31(C)(1) ]****(1) Separation from Other Circuits. SEE ATTACHED FOR CHANGES**

The life safety branch and critical branch of the essential electrical system shall be kept entirely independent of all other wiring and equipment and shall not enter the same raceways, boxes, or cabinets with each other or other wiring.

Where general care locations are served from two separate transfer switches on the essential electrical 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 essential electrical system in accordance with 517.19(A), Exception No. 2, the critical care circuits from the two separate systems shall be kept independent of each other.

Wiring of the life safety branch and the critical branch shall be permitted to occupy the same raceways, boxes, or cabinets of other circuits not part of the branch where such wiring complies with one of the following:

- (1) Is in transfer equipment enclosures
- (2) Is in exit or emergency luminaires supplied from two sources
- (3) Is in a common junction box attached to exit or emergency luminaires supplied from two sources
- (4) Is for two or more circuits supplied from the same branch and same transfer switch

The wiring of the equipment branch shall be permitted to occupy the same raceways, boxes, or cabinets of other circuits that are not part of the essential electrical system.

**Supplemental Information**

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
70_FR8772_517.31_C_1_.docx	For staff use	✓

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15  
**Organization:** [ Not Specified ]  
**Street Address:**  
**City:**  
**State:**  
**Zip:**  
**Submission Date:** Fri Jan 19 08:41:12 EST 2018

Make Editorial Changes  
Based on Committee Text

**Committee Statement and Meeting Notes**

**Committee Statement:** The panel clarified the logical order and intent of separation of circuits used for the critical branch and life safety branch conductors in the same enclosures, raceways, boxes, and cabinets from all other circuits. This change correlates with wiring installations for emergency systems in 700.10.

In response to the Correlating Committee Public Comment 1813 in the 2017 cycle and in accordance with 4.3.3 of the NEC Style manual and 2.3.2.11 of the Manual of Style for NFPA Technical Committee Documents, permission was sought and obtained from HEA-FUN to use parenthetical references between specific older and current NFPA 99 terminology in the NEC as a transition. For 2020 NEC®, CMP 15 modifies the use of transitional terminology as follows: "Category 1 Space (Critical Care Space)", "Category 2 Space (General Care Space)", "Category 3 Space (Basic Care Space)", and "Category 3 Space (Support Space)".

**Response**  
**Message:**

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**First Revision No. 8748-NFPA 70-2018 [ Section No. 517.31(C)(3) ]****(3) Mechanical Protection of the Essential Electrical System.**

The wiring of the life safety and critical branches shall be mechanically protected. Where installed as branch circuits in patient care spaces, the installation shall comply with the requirements of 517.13(A) and (B). Only the following wiring methods shall be permitted:

- (1) Nonflexible metal raceways, Type MI cable, Type RTRC marked with the suffix -XW, or Schedule 80 PVC conduit. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.
- (2) Where encased in not less than 50 mm (2 in.) of concrete, Schedule 40 PVC conduit, flexible nonmetallic or jacketed metallic raceways, or jacketed metallic cable assemblies listed for installation in concrete. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.
- (3) Listed flexible metal raceways and listed metal sheathed cable assemblies in any of the following:
  - (4) Where used in listed prefabricated medical headwalls
  - (5) In listed office furnishings
  - (6) Where fished into existing walls or ceilings, not otherwise accessible and not subject to physical damage
  - (7) Where necessary for flexible connection to equipment
  - (8) For equipment that requires a flexible connection due to movement, vibration, or operation
  - (9) Luminaires installed in
    - rigid
      - a. ceiling structures

where there is no access above the ceiling space after the luminaire is installed
      - a. , where connected with flexible steel metal raceways
- (10) Flexible power cords of appliances or other utilization equipment connected to the emergency system.
- (11) Cables for Class 2 or Class 3 systems permitted by Part VI of this Article, with or without raceways.

Informational Note: See 517.13 for additional grounding requirements in patient care areas.

**Supplemental Information**

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
Panel_15_FR-8748_517.31_C_3_leg_changes.docx	For staff use	✓

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Thu Jan 18 17:08:42 EST 2018

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**Committee Statement and Meeting Notes**

WORKING DRAFT OF CMP MEETING OUTPUT - NATIONAL ELECTRICAL CODE - NFPA 70  
JANUARY 8 - 20, 2018 - SUBJECT TO REVISION - NOT FOR PUBLICATION

**Committee Statement:** Where luminaires are installed with hard-piped connections in ceilings, replacement or maintenance of the fixture can be difficult. The revision permits flexible raceways in any ceiling structure.

**Response Message:**

[Public Input No. 3718-NFPA 70-2017 \[Section No. 517.31\(C\)\(3\)\]](#)

[Public Input No. 1077-NFPA 70-2017 \[Section No. 517.31\(C\)\(3\)\]](#)

FOR CODE-MAKING PANEL USE ONLY  
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**First Revision No. 8773-NFPA 70-2018 [ Section No. 517.31(D) ]****(D) Capacity of Systems.**

The essential electrical system shall have the capacity and rating to meet the maximum actual demand likely to be produced by the connected load.

Feeders shall be sized in accordance with 215.2 and Part III of Article 220. The ~~generator set(s)~~ alternate source shall have the capacity and rating to meet the demand produced by the load at any given time.

Demand calculations for sizing of the ~~generator set~~ alternate source (s) shall be based on any of the following:

- (1) Prudent demand factors and historical data
- (2) Connected load
- (3) Feeder calculation procedures described in Article 220
- (4) Any combination of the above

The sizing requirements in 700.4 and 701.4 shall not apply to ~~hospital generator set~~ alternate source (s).

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Jan 19 08:47:12 EST 2018

Make Editorial Changes  
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Text

**Committee Statement and Meeting Notes**

**Committee Statement:** The revised text adds clarity to the Code and applies to all alternate power sources as outlined in 517.30.

**Response Message:**

Public Input No. 3825-NFPA 70-2017 [Section No. 517.31(D)]


**First Revision No. 8774-NFPA 70-2018 [ Section No. 517.34(A) ]**
**(A) Task Illumination and Selected Receptacles. SEE ATTACHED FOR CHANGES**

The critical branch of the essential electrical system shall supply power for task illumination, fixed equipment, selected receptacles, and special power circuits serving the following areas and functions related to patient care:

- (1) Critical care (Category 1) spaces that utilize anesthetizing gases, task illumination, selected receptacles, and fixed equipment
- (2) The isolated power systems in special environments
- (3) Patient care spaces, task illumination, and selected receptacles in the following:
  - (4) Infant nurseries
  - (5) Medication preparation areas
  - (6) Pharmacy dispensing areas
  - (7) Selected acute nursing areas
  - (8) Psychiatric bed areas (omit receptacles)
  - (9) Ward treatment rooms
  - (10) Nurses' stations (unless adequately lighted by corridor luminaires)
- (11) Additional specialized patient care task illumination and receptacles, where needed
- (12) Nurse call systems
- (13) Blood, bone, and tissue banks
- (14) Telephone and data equipment rooms and closets
- (15) Task illumination, selected receptacles, and selected power circuits for the following:
  - (16) General care (Category 2) beds (at least one duplex receptacle in each patient bedroom)
  - (17) Angiographic labs
  - (18) Cardiac catheterization labs
  - (19) Coronary care units
  - (20) Hemodialysis rooms or areas
  - (21) Emergency room treatment areas (selected)
  - (22) Human physiology labs
  - (23) Intensive care units
  - (24) Postoperative recovery rooms (selected)
- (25) Additional task illumination, receptacles, and selected power circuits needed for effective facility operation, including single-phase fractional horsepower motors, shall be permitted to be connected to the critical branch. [99:6.4.2.2.4.2(9)]

**Supplemental Information**

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
70_FR8774_517.34_A_.docx	For staff use	✓

## Submitter Information Verification

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

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**Zip:**

**Submittal Date:** Fri Jan 19 08:57:16 EST 2018

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## Committee Statement and Meeting Notes

**Committee Statement:** The words "Fixed Equipment" were added to the title to provide clarity. Changes were made to update NEC section to the current NFPA 99-2018 extracted language and references.

The panel notes the publication date of NFPA 99 is later than the closing date of the NFPA 70 Public Input period. This disconnect makes the coordination of the two documents impossible during the public input period. The panel will work on key coordination issues during the interim period between the First Revision Stage and the Second Revision Stage.

**Response Message:**

[Public Input No. 3822-NFPA 70-2017 \[Section No. 517.34\(A\)\]](#)

[Public Input No. 3123-NFPA 70-2017 \[Section No. 517.34\(A\)\]](#)

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**First Revision No. 8777-NFPA 70-2018 [ Section No. 517.35(C) ]**

**[MOVE TO 517.43, LOCATE AT END OF SECTION] (C)** AC Equipment for Nondelayed Automatic Connection.

Generator accessories, including but not limited to, the transfer fuel pump, electrically operated louvers, and other generator accessories essential for generator operation shall be arranged for automatic connection to the alternate power source. [99:6.5 7 .2 6 .2.3.2 1.6(C) ]

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Jan 19 09:12:41 EST 2018

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**Committee Statement and Meeting Notes**

**Committee Statement:** This requirement was moved from 517.35 to 517.43 for two reasons:

(1) The material contained in this rule is extracted from NFPA 99. NFPA 99 section 6.5 speaks to Type 2 EES, 517.35 speaks to Type 1 EES.

(2) The current language conflicts with section 517.33(F), which directs that generator accessories and other like equipment shall be placed on the Life Safety Branch of the Essential Electrical System, rather than the Equipment Branch of the EES as directed in 517.35(C).

**Response Message:**

Public Input No. 2321-NFPA 70-2017 [Section No. 517.35(C)]

Public Input No. 2919-NFPA 70-2017 [New Section after 517.43]



## First Revision No. 8710-NFPA 70-2018 [ Section No. 517.40 ]

### 517.40 Type 2 Essential Electrical Systems for Nursing Homes and Limited Care Facilities. [SEE ATTACHMENT FOR FINAL REVISIONS]

Informational Note: Nursing homes and other limited care facilities can be classified as Category 1 (critical care- ~~Category 1~~) or Category 2 (general care- ~~Category 2~~) patient care space depending on the design and type of care administered in the facility. For small, less complex facilities, only minimal alternate lighting and alarm service may be required. At nursing homes and other limited care facilities where patients are not sustained by electrical life-support equipment or inpatient hospital care the requirements of 517.40 through 517.41 apply. If the level of care is comparable to that provided in a hospital, see the essential electrical system requirements of 517.29 through 517.30.

#### (A) Applicability.

The requirements of Part III, 517.40(C) through 517.41, shall apply to ~~nursing homes and limited care facilities~~ Category 2 (general care) spaces.

*Exception: The requirements of Part III, 517.40(C) through 517.41, shall not apply to freestanding buildings used as nursing homes and limited care facilities, provided that the following apply:*

- (1) *Admitting and discharge policies are maintained that preclude the provision of care for any patient or resident who may need to be sustained by electrical life-support equipment.*
- (2) *No surgical treatment requiring general anesthesia is offered.*
- (3) *An automatic battery-operated system(s) or equipment shall be effective for at least 1½ hours and is otherwise in accordance with 700.12 and that shall be capable of supplying lighting for exit lights, exit corridors, stairways, nursing stations, medical preparation areas, boiler rooms, and communications areas. This system shall also supply power to operate all alarm systems.*

Informational Note: See NFPA 101-2015 2018, *Life Safety Code*.

#### (B) ~~Category 1 (Critical Care) Spaces, Inpatient Hospital Care Facilities.~~

For those nursing homes and limited care facilities that admit patients who need to be sustained by electrical life support equipment, the essential electrical system from the source to the portion of the facility where such patients are treated shall comply with the requirements of Part III, 517.29 through 517.35.

#### (C) Facilities Contiguous or Located on the Same Site with Hospitals.

Nursing homes and limited care facilities that are contiguous or located on the same site with a hospital shall be permitted to have their essential electrical systems supplied by the hospital.

Informational Note No. 1: For performance, maintenance, and testing requirements of essential electrical systems in nursing homes and limited care facilities, see NFPA 99-2015 2018, *Health Care Facilities Code*.

Informational Note No. 2: Where optional loads include contiguous or same-site facilities not covered in this Code, see the requirements of Article 700 of this Code; NFPA 101-2015 2018, *Life Safety Code*; and other applicable NFPA requirements for emergency egress under loadshed conditions.

## Supplemental Information

File Name	Description	Approved
70_FR8710_517.40.docx	For staff use	✓

## Submitter Information Verification

Submitter Full Name: NEC-CMP Panel 15

Organization: [ Not Specified ]

Street Address:

Make Editorial Changes  
Based on Committee Text

**City:****State:****Zip:****Submittal Date:** Thu Jan 18 13:42:11 EST 2018

## Committee Statement and Meeting Notes

**Committee Statement:** The revised language correlates NFPA 99 Type 1 language with the Section 517.

Editorial changes to correlate NFPA 99-2018, Health Care Facilities Code and NFPA 20-2016, and NFPA 101-2018, Life Safety Code to NFPA 99 extracted text reference to 517.40.

In response to the Correlating Committee Public Comment 1813 in the 2017 cycle and in accordance with 4.3.3 of the NEC Style manual and 2.3.2.11 of the Manual of Style for NFPA Technical Committee Documents, permission was sought and obtained from HEA-FUN to use parenthetical references between specific older and current NFPA 99 terminology in the NEC as a transition. For 2020 NEC®, CMP 15 modifies the use of transitional terminology as follows: "Category 1 Space (Critical Care Space)", "Category 2 Space (General Care Space)", "Category 3 Space (Basic Care Space)", and "Category 3 Space (Support Space)".

**Response Message:**

[Public Input No. 3823-NFPA 70-2017 \[Section No. 517.40\]](#)

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**First Revision No. 8811-NFPA 70-2018 [ Section No. 517.42 ]****517.42 Essential Electrical Systems. SEE ATTACHED FOR CHANGES****(A) General.**

Essential electrical systems for nursing homes and limited care facilities shall be divided into the following two branches, the life safety branch and the equipment branch. [99:6.5.2.2.1.2]

The division between the branches shall occur at transfer switches where more than one transfer switch is required.

Informational Note No. 1: Essential electrical systems are comprised of two separate branches capable of supplying a limited amount of lighting and power service, which is considered essential for the protection of life and safety and effective operation of the institution during the time normal electrical service is interrupted for any reason.

Informational Note No. 2: For more information see NFPA 99-2015, *Health Care Facilities Code*.

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**(B) Transfer Switches.**

The number of transfer switches to be used shall be based on reliability, design, and load considerations. [99:6.5.2.2.1.4]

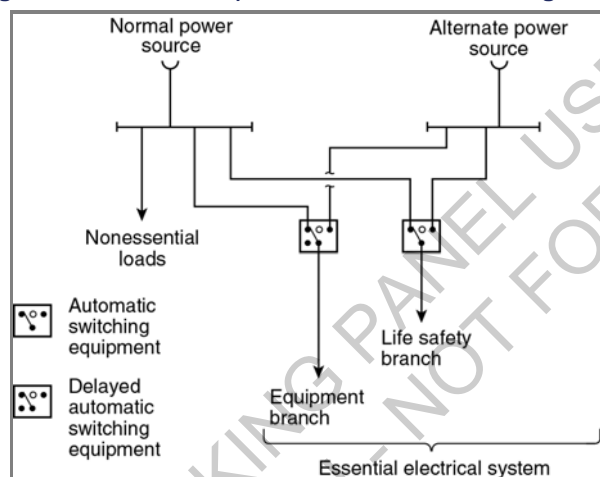
- (1) Each branch of the essential electrical system shall have one or more transfer switches. [99:6.5.2.2.1.4(A)]
- (2) One transfer switch shall be permitted to serve one or more branches or systems in a facility with a continuous load on the switch of 150 kVA (120 kW) or less. [99:6.5.2.2.1.4(B)]

Informational Note No. 1: See NFPA 99-2015, *Health Care Facilities Code*, 6.5.3.2, Transfer Switch Operation Type II; 6.4.2.1.5, Automatic Transfer Switch Features; and 6.4.2.1.7, Nonautomatic Transfer Device Features.

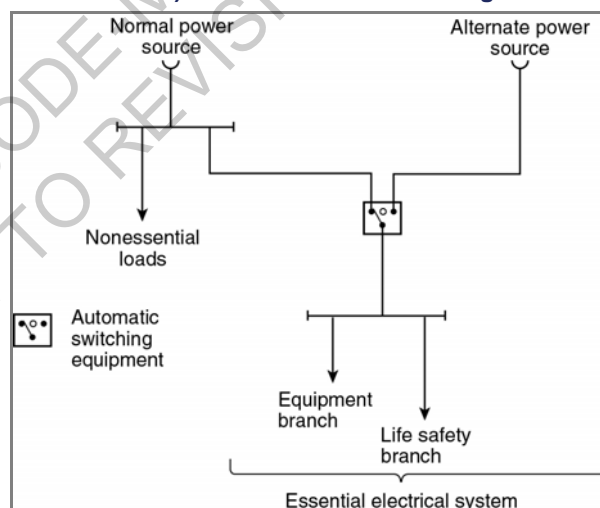
Informational Note No. 2: See Informational Note Figure 517.42(a).

Informational Note No. 3: See Informational Note Figure 517.42(b).

**Figure Informational Note Figure 517.42(a) Nursing Home and Limited Health Care Facilities — Minimum Requirement (greater than 150 kVA) for Transfer Switch Arrangement.**



**Figure Informational Note Figure 517.42(b) Nursing Home and Limited Health Care Facilities — Minimum Requirement (150 kVA or less) for Transfer Switch Arrangement.**

**(C) Capacity of System.**

The essential electrical system shall have adequate capacity to meet the demand for the operation of all functions and equipment to be served by each branch at one time.

**(D) Separation from Other Circuits.**

The life safety branch and equipment branch shall be kept entirely independent of all other wiring and equipment. [99:6.5.2.2.4.1]

These circuits shall not enter the same raceways, boxes, or cabinets with other wiring except as follows:

- (1) In transfer switches
- (2) In exit or emergency luminaires supplied from two sources
- (3) In a common junction box attached to exit or emergency luminaires supplied from two sources

Informational Note: For further information see NFPA 99-2015 *Health Care Facilities Code*, A.6.5.2.2.4.1.

**(E) Receptacle Identification.**

The electrical receptacles or the cover plates for the electrical receptacles supplied from the life safety or equipment branches shall have a distinctive color or marking to be readily identifiable. [99:6.5.2.2.4.2]

Informational Note: If color is used to identify these receptacles, the same color should be used throughout the facility. [99:A.6.5.2.2.4.2]

**Supplemental Information**

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
70_FR8811_517.42.docx	For staff use	✓

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Jan 19 12:41:38 EST 2018

Make Editorial Changes  
Based on Committee Text

**Committee Statement and Meeting Notes**

**Committee Statement:** Extracted material from NFPA 99-2018 was updated to the current language and references.

**Response Message:**

**First Revision No. 8780-NFPA 70-2018 [ Section No. 517.44(B) ]****(B) Delayed Automatic or Manual Connection to the Equipment Branch. SEE ATTACHED FOR CHANGES**

The following equipment shall be permitted to be connected to the critical equipment branch and shall be arranged for either delayed automatic or manual connection to the alternate power source:

**(1) Heating equipment to provide heating for patient rooms.**

*Exception: Heating of general patient rooms during disruption of the normal source shall not be required under any of the following conditions:*

(1) *The outside design temperature is higher than  $-6.7^{\circ}\text{C}$  ( $20^{\circ}\text{F}$ ).*

(2) *The outside design temperature is lower than  $-6.7^{\circ}\text{C}$  ( $20^{\circ}\text{F}$ ) and where a selected room(s) is provided for the needs of all confined patients, only such room(s) need be heated.*

(3) *The facility is served by a dual source of normal power as described in , Informational Note.*

*Informational Note: The outside design temperature is based on the 97.5 percent design values, as shown in Chapter 24 of the ASHRAE Handbook of Fundamentals (2013).*

(4) *Elevator service — in instances where disruption of power would result in elevators stopping between floors, throw-over facilities shall be provided to allow the temporary operation of any elevator for the release of passengers. For elevator cab lighting, control, and signal system requirements, see .*

(5) *Additional illumination, receptacles, and equipment shall be permitted to be connected only to the critical branch.*

[99:6.5.2.2.3.4(A), (B), and (C)]

**Supplemental Information**

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
70_FR8780_517.44_B_.docx	For staff use	✓

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Jan 19 09:25:37 EST 2018

Make Editorial Changes  
Based on Committee Text

**Committee Statement and Meeting Notes**

**Committee Statement:** The term "critical equipment branch" is not found in Article 517. It was removed for editorial clarity and usability of the NEC.

**Response Message:**

Public Input No. 1740-NFPA 70-2017 [Section No. 517.44(B)]

**First Revision No. 8782-NFPA 70-2018 [ Section No. 517.45(D) ]**

(D) ~~Category 2~~ ( General Care- (~~Category 2~~) ~~Patent~~- Patient Care Spaces.

Where Category 2 ( general care- (~~Category 2~~) ~~patent~~- patient care spaces are present, the essential electrical distribution system shall be as described in 517.40 through 517.45.

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Jan 19 09:29:48 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** This revision corrects the spelling of "patient."

In response to the Correlating Committee Public Comment 1813 in the 2017 cycle and in accordance with 4.3.3 of the NEC Style manual and 2.3.2.11 of the Manual of Style for NFPA Technical Committee Documents, permission was sought and obtained from HEA-FUN to use parenthetical references between specific older and current NFPA 99 terminology in the NEC as a transition. For 2020 NEC®, CMP 15 modifies the use of transitional terminology as follows: "Category 1 Space (Critical Care Space)", "Category 2 Space (General Care Space)", "Category 3 Space (Basic Care Space)", and "Category 3 Space (Support Space)".

**Response Message:**

[Public Input No. 1314-NFPA 70-2017 \[Section No. 517.45\(D\)\]](#)



**First Revision No. 8783-NFPA 70-2018 [ Section No. 517.61(B)(5) ]****(5) Receptacles and Attachment Plugs.**

Receptacles and attachment plugs located above hazardous (classified) anesthetizing locations shall be listed for hospital use for services of prescribed voltage, frequency, rating, and number of conductors with provision for the connection of the equipment grounding conductor. This requirement shall apply to attachment plugs and receptacles of the 2-pole, 3-wire grounding type for single-phase, 120-volt, nominal, ac service.

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submittal Date:** Fri Jan 19 09:34:11 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** Use of the term "Equipment Grounding Conductor" is correct. The term "grounding conductor" is one that is no longer defined. As part of a Correlating Committee Task Force activity on grounding and bonding in general, this term and its related definition was removed from the NEC during the 2008 NEC cycle.

**Response Message:**

Public Input No. 2405-NFPA 70-2017 [Section No. 517.61(B)(5)]

**First Revision No. 8705-NFPA 70-2018 [ Section No. 517.61(C)(1) ]****(1) Wiring Methods.**

Wiring serving other-than-hazardous (classified) locations, as defined in 517.60, shall be installed in a metal raceway system or cable assembly. The metal raceway system or cable armor or sheath assembly shall qualify as an equipment grounding conductor in accordance with 250.118. Type MC and Type MI cable shall have an outer metal armor, sheath, or sheath assembly that is identified as an ~~acceptable~~ equipment grounding conductor.

*Exception: Pendant receptacle installations that employ listed Type SJO or equivalent hard usage or extra-hard usage, flexible cords suspended not less than 1.8 m (6 ft) from the floor shall not be required to be installed in a metal raceway or cable assembly.*

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submittal Date:** Thu Jan 18 13:31:27 EST 2018[Make Editorial Changes  
Based on Committee  
Text](#)**Committee Statement and Meeting Notes**

**Committee Statement:** The term "acceptable" is in violation of the NEC Style Manual 3.2.1. The Code Making Panel has removed the term as it is an unenforceable or vague term.

**Response Message:**

**First Revision No. 8787-NFPA 70-2018 [ Section No. 517.61(C)(2) ]****(2) Receptacles and Attachment Plugs.**

Receptacles and attachment plugs installed and used in other-than-hazardous (classified) locations shall be listed "hospital grade" for services of prescribed voltage, frequency, rating, and number of conductors with provision for connection of the equipment grounding conductor. This requirement shall apply to 2-pole, 3-wire grounding type for single-phase, 120-, 208-, or 240-volt, nominal, ac service.

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submittal Date:** Fri Jan 19 09:58:11 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** Use of the term "Equipment Grounding Conductor" is correct. The term "grounding conductor" is one that is no longer defined. As part of a Correlating Committee Task Force activity on grounding and bonding in general, this term and its related definition was removed from the NEC during the 2008 NEC cycle.

**Response Message:**

Public Input No. 2406-NFPA 70-2017 [Section No. 517.61(C)(2)]

**First Revision No. 8708-NFPA 70-2018 [ Section No. 517.72(A) ]****(A) Capacity.**

A disconnecting means of ~~adequate capacity~~ rated for at least 50 percent of the input required for the momentary rating or 100 percent of the input required for the long-time rating of the X-ray equipment, whichever is greater, shall be provided in the supply circuit.

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submission Date:** Thu Jan 18 13:39:41 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** The term "adequate" is in violation of the NEC Style Manual 3.2.1. The Code Making Panel has removed the term as it is an unenforceable or vague term.

**Response Message:**

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SUBJECT TO REVISION - NOT FOR PUBLICATION

**First Revision No. 8702-NFPA 70-2018 [ Section No. 517.81 ]****517.81 Other-Than-Patient-Care Areas Spaces .**

In other-than-patient-care ~~areas~~ spaces , installations shall be in accordance with ~~the applicable provisions of~~ other parts of this Code.

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submission Date:** Thu Jan 18 13:25:46 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** The word "areas" was replaced with "spaces" to conform editorially to other sections of Article 517. The phrase "the applicable provisions of" is in violation of the NEC Style Manual 3.2.1 and is unnecessary and redundant and is being deleted to increase usability.

**Response Message:**

**First Revision No. 8813-NFPA 70-2018 [ Section No. 518.2 ]****518.2 General Classification.****(A) Examples.**

Assembly occupancies shall include, but not be limited to, the following:

Armories	Exhibition halls
Assembly halls	Gymnasiums
Auditoriums	Mortuary chapels
Bowling lanes	Multipurpose rooms
Club rooms	Museums
Conference rooms	Places of awaiting transportation
Courtrooms	Places of religious worship
Dance halls	Pool rooms
Dining and drinking facilities	Restaurants
	Skating rinks

**(B) Multiple Occupancies.**

Where an assembly occupancy forms a portion of a building containing other occupancies, Article 518 applies only to that portion of the building considered an assembly occupancy. Occupancy of any room or space for assembly purposes by less than 100 persons in a building of other occupancy, and incidental to such other occupancy, shall be classified as part of the other occupancy ~~and subject to the provisions applicable thereto~~.

**(C) Theatrical Areas.**

Where any such building structure, or portion thereof, contains a projection booth or stage platform or area for the presentation of theatrical or musical productions, either fixed or portable, the wiring for that area, including associated audience seating areas, and all equipment that is used in the referenced area, and portable equipment and wiring for use in the production that will not be connected to permanently installed wiring, shall comply with Article 520.

Informational Note: For methods of determining population capacity, see local building code or, in its absence, NFPA 101-2015 2018, *Life Safety Code*.

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

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**Zip:**

**Submittal Date:** Fri Jan 19 12:48:54 EST 2018

Make Editorial Changes  
Based on Committee Text

**Committee Statement and Meeting Notes**

**Committee Statement:** The phrase "and subject to the provisions applicable thereto" is unnecessary and redundant and is being deleted to increase usability.

The reference to NFPA 101 Life Safety Code in the informational note is being corrected to the 2018 edition.

WORKING DRAFT OF CMP MEETING OUTPUT - NATIONAL ELECTRICAL CODE - NFPA 70  
JANUARY 8 - 20, 2018 - SUBJECT TO REVISION - NOT FOR PUBLICATION

**Response**  
**Message:**

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**First Revision No. 8820-NFPA 70-2018 [ Section No. 518.4(A) ]****(A) General.**

The fixed wiring methods shall be metal raceways, flexible metal raceways, nonmetallic raceways encased in not less than 50 mm (2 in.) of concrete, Type MI, MC, or AC cable. The wiring method shall itself qualify as an equipment grounding conductor according to 250.118 or shall contain an insulated equipment grounding conductor sized in accordance with Table 250.122.

*Exception: Fixed wiring methods shall be as provided in*

- (a) *Audio signal processing, amplification, and reproduction equipment — Article 640*
- (b) *Communications circuits systems — Article 800 Chapter 8*
- (c) *Class 2 and Class 3 remote-control and signaling circuits — Article 725*
- (d) *Fire alarm circuits — Article 760*

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Jan 19 13:09:58 EST 2018

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Text

**Committee Statement and Meeting Notes**

**Committee Statement:** Many feeder size MC cables use a bare equipment grounding conductor, and there is no technical reason that an insulated equipment grounding conductor would be required within a cable assembly.

There are communications systems requirements contained in other articles within Chapter 8.

**Response Message:**

Public Input No. 3099-NFPA 70-2017 [Section No. 518.4(A)]



**First Revision No. 8821-NFPA 70-2018 [ Section No. 518.4(B) ]****(B) Nonrated Construction.**

In addition to the wiring methods of 518.4(A), nonmetallic-sheathed cable, ~~Type AC cable~~, electrical nonmetallic tubing, and rigid nonmetallic conduit shall be permitted to be installed in those buildings or portions thereof that are not required to be of fire-rated construction by the applicable building code.

Informational Note: Fire-rated construction is the fire-resistive classification used in building codes.

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Jan 19 13:12:56 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** Type AC is already permitted in 518.4(A) and there is no need to list it in 518.4(B) as a wiring method that is permitted in addition to the wiring methods permitted in (A).

**Response Message:**

[Public Input No. 1892-NFPA 70-2017 \[Section No. 518.4\(B\)\]](#)

[Public Input No. 3101-NFPA 70-2017 \[Section No. 518.4\(B\)\]](#)

**First Revision No. 8822-NFPA 70-2018 [ Section No. 518.5 ]****518.5 Supply.**

Portable switchboards and portable power distribution equipment shall be supplied only from listed power outlets of sufficient voltage and ampere rating. Such power outlets shall be protected by overcurrent devices. Such overcurrent devices and power outlets shall not be accessible to the general public. Provisions for connection of an equipment grounding conductor shall be provided. The neutral conductor of feeders supplying solid-state phase control, 3-phase, 4-wire dimmer systems shall be considered a current-carrying conductor for purposes of ampacity adjustment. The neutral conductor of feeders supplying solid-state sine wave, 3-phase, 4-wire dimming systems shall not be considered a current-carrying conductor for purposes of ampacity adjustment.

*Exception: The neutral conductor of feeders supplying systems that use or may use are capable of using both phase-control and sine-wave dimmers shall be considered as current-carrying for purposes of ampacity adjustment.*

Informational Note: For definitions of solid-state dimmer types, see 520.2.

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Jan 19 13:17:39 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** The word "may" has been replaced with "or are capable of using" to comply with the NEC Style Manual and add clarity.

**Response Message:**

**First Revision No. 8827-NFPA 70-2018 [ Section No. 520.25(B) ]**

~~(B) Resistance or Reactor-Type Dimmers.~~

~~Resistance or series reactor-type dimmers shall be permitted to be placed in either the grounded or the ungrounded conductor of the circuit. Where designed to open either the supply circuit to the dimmer or the circuit controlled by it, the dimmer shall then comply with 404.2(B). Resistance or reactor-type dimmers placed in the grounded neutral conductor of the circuit shall not open the circuit.~~

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submission Date:** Fri Jan 19 13:31:41 EST 2018

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**Committee Statement and Meeting Notes**

**Committee Statement:** Resistance and reactor type dimmers for theatrical use have not been manufactured or installed for at least 50 years. It is now time to delete this obsolete section of the Code.

**Response Message:**

Public Input No. 1479-NFPA 70-2017 [Section No. 520.25(B)]

**First Revision No. 8828-NFPA 70-2018 [ Section No. 520.27(B) ]****(B) Neutral Conductor.**

For the purpose of ampacity adjustment, the following shall apply:

- (1) The neutral conductor of feeders supplying solid-state, phase-control 3-phase, 4-wire dimming systems shall be considered a current-carrying conductor.
- (2) The neutral conductor of feeders supplying solid-state, sine wave 3-phase, 4-wire dimming systems shall not be considered a current-carrying conductor.
- (3) The neutral conductor of feeders supplying systems that use or ~~may use~~ are capable of using both phase-control and sine wave dimmers shall be considered as current-carrying.

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submission Date:** Fri Jan 19 13:33:01 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** The word "may" has been replaced with "or are capable of using" to comply with the NEC Style Manual and add clarity.

**Response Message:**

**First Revision No. 8830-NFPA 70-2018 [ Section No. 520.44 ]****520.44 Borders, Proscenium Sidelights, Drop Boxes, and Connector Strips.****(A) General.**

Borders and proscenium sidelights shall be as follows:

- (1) Constructed as specified in 520.43
- (2) Suitably stayed and supported
- (3) Designed so that the flanges of the reflectors or other adequate guards protect the lamps from mechanical damage and from accidental contact with scenery or other combustible material

**(B) Connector Strips and Drop Boxes.**

Connector strips and drop boxes shall be as follows:

- (1) Suitably stayed and supported
- (2) Listed as stage and studio wiring devices

**(C) Cords and Cables for Border Lights, Drop Boxes, and Connector Strips.****(1) General.**

Cords and cables for supply to border lights, drop boxes, and connector strips shall be listed for extra-hard usage. The cords and cables shall be suitably supported. Such cords and cables shall be employed only where flexible conductors are necessary. Ampacity of the conductors shall be as provided in 400.5.

**(2) Cords and Cables Not in Contact with Heat-Producing Equipment.**

Listed multiconductor extra-hard-usage-type cords and cables not in direct contact with equipment containing heat-producing elements shall be permitted to have their ampacity determined by Table 520.44(C)(3). Maximum load current in any conductor with an ampacity determined by Table 520.44(C)(3) shall not exceed the values in Table 520.44(C)(3).

**(3) Identification of Conductors in Multiconductor Extra-Hard-Usage Cords and Cables.**

Grounded ( neutral ) conductors shall be white without stripe or shall be identified by a distinctive white marking at their terminations. ~~Grounding~~ Equipment grounding conductors shall be green with or without yellow stripe or shall be identified by a distinctive green marking at their terminations.

Table 520.44(C)(3) Ampacity of Listed Extra-Hard-Usage Cords and Cables with Temperature Ratings of 75°C (167°F) and 90°C (194°F)\* [Based on Ambient Temperature of 30°C (86°F)]

<u>Size</u> <u>(AWG)</u>	<u>Temperature Rating of</u> <u>Cords and Cables</u>		<u>Maximum Rating of Overcurrent Device</u>
	<u>75°C</u>	<u>90°C</u>	
	<u>(167°F)</u>	<u>(194°F)</u>	
14	24	28	15
12	32	35	20
10	41	47	25
8	57	65	35
6	77	87	45
4	101	114	60
2	133	152	80

\*Ampacity shown is the ampacity for multiconductor cords and cables where only three copper conductors are current-carrying as described in 400.5. If the number of current-carrying conductors in a cord or cable exceeds three and the load diversity is 50 percent or less, the ampacity of each conductor shall be reduced as shown in the following table:

Table 520.44(C)(3)(a) Ampacity Adjustment Factors for More Than Three Current-Carrying Conductors in a Cord or Cable Where Load Diversity Is 50% or Less

<u>Number of Conductors</u>	<u>Percent of Ampacity Value in Table 520.44(C)(3)</u>
4–6	80
7–24	70
25–42	60
43 and above	50

Note: Ultimate insulation temperature. In no case shall conductors be associated together in such a way with respect to the kind of circuit, the wiring method used, or the number of conductors such that the temperature limit of the conductors is exceeded.

A neutral conductor that carries only the unbalanced current from other conductors of the same circuit need not be considered as a current-carrying conductor.

In a 3-wire circuit consisting of two-phase conductors and the neutral conductor of a 4-wire, 3-phase, wye-connected system, the neutral conductor carries approximately the same current as the line-to-neutral currents of the other conductors and shall be considered to be a current-carrying conductor.

On a 4-wire, 3-phase wye circuit where the major portion of the load consists of nonlinear loads, there are harmonic currents in the neutral conductor. Therefore, the neutral conductor shall be considered to be a current-carrying conductor.

Informational Note: For the purposes of Table 520.44(C)(3)(a), load diversity is the percentage of the total current of all simultaneously energized circuits fed by the cable to the sum of the ampacity ratings of all circuits in that cable.

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

Make Editorial Changes  
Based on Committee Text

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Jan 19 13:35:28 EST 2018

### Committee Statement and Meeting Notes

**Committee Statement:** The word "rating" has been deleted as it is not appropriate when used in conjunction with "ampacity".  
The word "equipment" has been added to "grounding conductor", as that is the correct term. "Grounded (neutral) conductor" has been changed to "Grounded neutral conductor" to conform with the term elsewhere in the NEC.

The word "adequate" has been removed to conform with the NEC Style Manual.

**Response Message:**

[Public Input No. 2013-NFPA 70-2017 \[Section No. 520.44\(C\)\(3\)\]](#)

[Public Input No. 2142-NFPA 70-2017 \[Section No. 520.44\(C\)\(3\)\]](#)

FOR CODE-MAKING PANEL USE ONLY  
SUBJECT TO REVISION - NOT FOR PUBLICATION

**First Revision No. 8831-NFPA 70-2018 [ Section No. 520.46 ]****520.46 Connector Strips, Drop Boxes, Floor Pockets, and Other Outlet Enclosures.**

Receptacles for the connection of portable stage-lighting equipment shall be pendant or mounted in ~~suitable~~ pockets or enclosures and shall comply with 520.45. Supply cables for connector strips and drop boxes shall be as specified in 520.44(C).

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submittal Date:** Fri Jan 19 13:38:45 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes****Committee Statement:** The word "suitable" has been deleted to comply with the NEC Style Manual.**Response Message:**



**First Revision No. 8832-NFPA 70-2018 [ Section No. 520.49 ]****520.49** Smoke Ventilator Control.

Where stage smoke ventilators are released by an electrical device, the circuit operating the device shall be normally closed and shall be controlled by at least two externally operable switches, one switch being placed at a readily accessible location on stage and the other where designated by the authority having jurisdiction. The device shall be designed for the full voltage of the circuit to which it is connected, no resistance being inserted. The device shall be enclosed in a ~~suitable~~ metal box having a door that shall remain closed except during service to the equipment.

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submittal Date:** Fri Jan 19 13:39:53 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes****Committee Statement:** The word "suitable" has been deleted to comply with the NEC Style Manual.**Response Message:**

**First Revision No. 8817-NFPA 70-2018 [ Section No. 520.53(B) ]****(B) Neutral Terminal.**

In portable switchboard equipment designed for use with 3-phase, 4-wire with ground supply, the current rating of the supply neutral terminal, and the ampacity of its associated busbar ~~or equivalent~~ or wiring, or both, shall have an ampacity equal to at least twice the ampacity of the largest ungrounded supply terminal.

*Exception: Where portable switchboard equipment is specifically constructed and identified to be internally converted in the field, in an approved manner, from use with a balanced 3-phase, 4-wire with ground supply to a balanced single-phase, 3-wire with ground supply, the supply neutral terminal and its associated busbar, ~~equivalent~~ wiring, or both, shall have an ampacity equal to at least that of the largest ungrounded single-phase supply terminal.*

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submittal Date:** Fri Jan 19 12:57:52 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** CMP-15 has elected to remove the term equivalent in this section as it does not add clarity to the section and change provides compliance with the NEC Style Manual.

**Response Message:**

**First Revision No. 8815-NFPA 70-2018 [ Section No. 520.54 ]****520.54 Supply Conductors.****(A) General.**

The supply to a portable stage switchboard shall be by means of listed extra-hard usage cords or cables. The supply cords or cables shall terminate within the switchboard enclosure in an externally operable fused master switch or circuit breaker or in an identified connector assembly. The supply cords or cable (and connector assembly) shall have current ratings not less than the total load connected to the switchboard and shall be protected by overcurrent devices.

**(B) Conductor Sizing.**

The power supply conductors for portable stage switchboards utilizing solid-state phase control dimmers shall be sized considering the neutral conductor as a current-carrying conductor for ampacity adjustment purposes. The power supply conductors for portable stage switchboards utilizing only solid-state sine wave dimmers shall be sized considering the neutral conductor as a non-current carrying conductor for ampacity adjustment purposes.

**(C) Single-Conductor Cables.**

Single-conductor portable supply cable sets shall be not smaller than 2 AWG conductors. The equipment grounding conductor shall not be smaller than 6 AWG conductor. Single-conductor grounded neutral cables for a supply shall be sized in accordance with 520.54(J). Where single conductors are paralleled for increased ampacity, the paralleled conductors shall be of the same length and size. Single-conductor supply cables shall be grouped together but not bundled. The equipment grounding conductor shall be permitted to be of a different type, provided it meets the other requirements of this section, and it shall be permitted to be reduced in size as permitted by 250.122. Grounded (neutral) and equipment grounding conductors shall be identified in accordance with 200.6, 250.119, and 310.110. Grounded conductors shall be permitted to be identified by marking at least the first 150 mm (6 in.) from both ends of each length of conductor with white or gray. Equipment grounding conductors shall be permitted to be identified by marking at least the first 150 mm (6 in.) from both ends of each length of conductor with green or green with yellow stripes. Where more than one nominal voltage exists within the same premises, each ungrounded conductor shall be identified by system.

**(D) Supply Conductors Not Over 3 m (10 ft) Long.**

Where supply conductors do not exceed 3 m (10 ft) in length between supply and switchboard or supply and a subsequent overcurrent device, the supply conductors shall be permitted to be reduced in size where all of the following conditions are met:

- (1) The ampacity of the supply conductors shall be at least one-quarter of the current rating of the supply overcurrent protective device.
- (2) The supply conductors shall terminate in a single overcurrent protective device that will limit the load to the ampacity of the supply conductors. This single overcurrent device shall be permitted to supply additional overcurrent devices on its load side.
- (3) The supply conductors shall not penetrate walls, floors, or ceilings or be run through doors or traffic areas. The supply conductors shall be adequately protected from physical damage.
- (4) The supply conductors shall be suitably terminated in an approved manner.
- (5) Conductors shall be continuous without splices or connectors.
- (6) Conductors shall not be bundled.
- (7) Conductors shall be supported above the floor in an approved manner.

**(E) Supply Conductors Not Over 6 m (20 ft) Long.**

Where supply conductors do not exceed 6 m (20 ft) in length between supply and switchboard or supply and a subsequent overcurrent protection device, the supply conductors shall be permitted to be reduced in size where all of the following conditions are met:

- (1) The ampacity of the supply conductors shall be at least one-half of the current rating of the supply overcurrent protective device.
- (2) The supply conductors shall terminate in a single overcurrent protective device that limits the load to the ampacity of the supply conductors. This single overcurrent device shall be permitted to supply additional overcurrent devices on its load side.
- (3) The supply conductors shall not penetrate walls, floors, or ceilings or be run through doors or traffic areas. The supply conductors shall be adequately protected from physical damage.
- (4) The supply conductors shall be suitably terminated in an approved manner.
- (5) The supply conductors shall be supported in an approved manner at least 2.1 m (7 ft) above the floor except at terminations.
- (6) The supply conductors shall not be bundled.
- (7) Tap conductors shall be in unbroken lengths.

**(F) Supply Conductors Not Reduced in Size.**

Supply conductors not reduced in size under provisions of 520.54(D) or (E) shall be permitted to pass through holes in walls specifically designed for the purpose. If penetration is through the fire-resistant-rated wall, it shall be in accordance with 300.21.

**(G) Protection of Supply Conductors and Connectors.**

All supply conductors and connectors shall be protected against physical damage by an approved means. This protection shall not be required to be raceways.

**(H) Number of Supply Interconnections.**

Where connectors are used in a supply conductor, there shall be a maximum number of three interconnections (mated connector pairs) where the total length from supply to switchboard does not exceed 30 m (100 ft). In cases where the total length from supply to switchboard exceeds 30 m (100 ft), one additional interconnection shall be permitted for each additional 30 m (100 ft) of supply conductor.

**(I) Single-Pole Separable Connectors.**

Where single-pole portable cable connectors are used, they shall be listed and of the locking type. Sections 406.7 and 406.8 shall not apply to listed single-pole separable connectors and single-conductor cable assemblies utilizing listed single-pole separable connectors.

**(J) Supply Neutral Conductor.**

Supply neutral conductors shall comply with (1) and (2) below:

**(1) Marking.**

Grounded neutral conductors shall be permitted to be identified by marking at least the first 150 mm (6 in.) from both ends of each length of conductor with white or gray.

**(2) Conductor Sizing.**

Where single-conductor feeder cables not installed in raceways are used on multiphase circuits feeding portable stage switchboards containing solid-state phase-control dimmers, the grounded neutral conductor shall have an ampacity of at least 130 percent of the ungrounded circuit conductors feeding the portable stage switchboard. Where such feeders are supplying only solid-state sine wave dimmers, the grounded neutral conductor shall have an ampacity of at least 100 percent of the ungrounded circuit conductors feeding the portable stage switchboard.

**(K) Qualified Personnel.**

The routing of portable supply conductors, the making and breaking of supply connectors and other supply connections, and the energization and de-energization of supply services shall be performed by qualified personnel, and portable switchboards shall be so marked, indicating this requirement in a permanent and conspicuous manner.

*Exception: A portable switchboard shall be permitted to be connected to a permanently installed supply receptacle by other than qualified personnel provided that the supply receptacle is protected for its current rating by an overcurrent device of not greater than 150 amperes, and where the receptacle, interconnection, and switchboard comply with all of the following:*

- (a) *They employ listed multipole connectors suitable for the purpose for every supply interconnection.*
- (b) *They prevent access to all supply connections by the general public.*
- (c) *They employ listed extra-hard usage multiconductor cords or cables with an ampacity not less than the load and not less than the ampere rating of the connectors.*

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Jan 19 12:53:14 EST 2018

Make Editorial Changes  
Based on Committee Text

**Committee Statement and Meeting Notes**

**Committee Statement:** The phrase "provisions of" is unnecessary and redundant and is being deleted to increase usability.

The word "adequate" has been deleted to conform with the NEC Style Manual.

The words "suitable for the purpose" have been deleted to conform with the NEC Style Manual.

**Response Message:**

**First Revision No. 8856-NFPA 70-2018 [ Section No. 520.62(E) ]****(E) Cable Arrangement.**

Cables shall be ~~adequately~~ protected where they pass through enclosures and be arranged so that tension on the cable is not transmitted to the terminations.

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submission Date:** Fri Jan 19 15:09:08 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes****Committee Statement:** The word "adequately" is being removed to conform with the NEC Style Manual.**Response Message:**

FOR CODE-MAKING PANEL USE ONLY  
SUBJECT TO REVISION - NOT FOR PUBLICATION

**First Revision No. 8833-NFPA 70-2018 [ Section No. 520.68 ]****520.68** Conductors for Portables.**(A)** Conductor Type.**(1)** General.

Flexible conductors, including cable extensions, used to supply portable stage equipment shall be listed extra-hard usage cords or cables.

**(2)** Protected Applications.

Listed, hard usage (junior hard service) cord or cable shall be permitted where all of the following conditions are met:

- (1) The cord or cable is protected from physical damage by attachment over its entire length to a pipe, tower, truss, scaffold, or other substantial support structure, or installed in a location that inherently prevents physical damage to the cord.
- (2) The cord or cable is connected to a branch circuit protected by an overcurrent protective device rated at not over 20 amperes.
- (3) The cord or cable does not exceed 30 m (100 ft) in length.

**(3)** Stand Lamps.

Listed, hard usage cord shall be permitted to supply stand lamps where the cord is not subject to physical damage and is protected by an overcurrent device rated at not over 20 amperes.

**(3.4)** Luminaire Supply Cords.

Listed hard usage supply cords shall be permitted to supply luminaires when all of the following conditions are met:

- (1) The supply cord is not longer than 2.0 m (6.6 ft).
- (2) The supply cord is attached at one end to the luminaire or a luminaire-specific listed connector that mates with a panel-mounted inlet on the body of the luminaire.
- (3) The supply cord is protected by an overcurrent protective device of not more than 20 amperes.
- (4) The luminaire is listed.
- (5) The supply cord is not subject to physical damage.

**(4.5)** High-Temperature Applications.

A special assembly of conductors in sleeving not longer than 1.0 m (3.3 ft) shall be permitted to be employed in lieu of flexible cord if the individual wires are stranded and rated not less than 125°C (257°F) and the outer sleeve is glass fiber with a wall thickness of at least 0.635 mm (0.025 in.).

Portable stage equipment requiring flexible supply conductors with a higher temperature rating where one end is permanently attached to the equipment shall be permitted to employ alternate, suitable conductors as determined by a qualified testing laboratory and recognized test standards.

**(5 6 ) Breakouts.**

Listed, hard usage (junior hard service) cords shall be permitted in breakout assemblies where all of the following conditions are met:

- (1) The cords are utilized to connect between a single multipole connector containing two or more branch circuits and multiple 2-pole, 3-wire connectors.
- (2) The longest cord in the breakout assembly does not exceed 6.0 m (20 ft).
- (3) The breakout assembly is protected from physical damage by attachment over its entire length to a pipe, truss, tower, scaffold, or other substantial support structure.
- (4) All branch circuits feeding the breakout assembly are protected by overcurrent devices rated at not over 20 amperes.

**(B) Conductor Ampacity.**

The ampacity of conductors shall be as given in 400.5, except multiconductor, listed, extra-hard usage portable cords that are not in direct contact with equipment containing heat-producing elements shall be permitted to have their ampacity determined by Table 520.44(C)(3). Maximum load current in any conductor with an ampacity determined by Table 520.44(C)(3) shall not exceed the values in Table 520.44(C)(3). Where the ampacity adjustment factors of Table 520.44(C)(3)(a) are applied for more than three current-carrying conductors in a portable cord, the load diversity shall be 50 percent or less.

*Exception: Where alternate conductors are allowed in 520.68(A)(4), their ampacity shall be as given in the appropriate table in this Code for the types of conductors employed.*

**(C) Overcurrent Protection.**

Overcurrent protection of conductors for portables shall comply with 240.5.

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Jan 19 13:42:10 EST 2018

Make Editorial Changes  
Based on Committee Text

**Committee Statement and Meeting Notes**

**Committee Statement:** Since the 1999 edition of the NEC, listed hard usage cord has been allowed in limited applications in Article 520 occupancies:

1. Breakout assemblies not over 20' in length, per 520.68(A)(5)
2. Adapters and two-fers not over 2m in length per 520.69(C)
3. Stand lamp supply cords per 520.68(A)(2).

The intervening period of use between 1999 and 2017 (18 years) has proven that hard usage cord performs safely in limited applications where not subject to physical damage. Based on this track record, there is no longer a reason to require extra-hard usage cord in such protected applications. While extra-hard usage cord still has a valid application in theatres where it is subject to damage from rolling or flying scenery, the additional weight, larger diameter, and lower flexibility of extra-hard usage cord provides no material safety advantage in the protected applications of this proposal, which represent a large portion of portable cable applications in article 520 occupancies.

The word "suitable" has been removed from 520.68(A)(4) in order to conform to the NEC Style Manual.



**Response**

**Message:**

[Public Input No. 1478-NFPA 70-2017 \[New Section after 520.68\(A\)\(1\)\]](#)

FOR CODE-MAKING PANEL USE ONLY  
SUBJECT TO REVISION - NOT FOR PUBLICATION


**First Revision No. 8840-NFPA 70-2018 [ Section No. 522.22 ]**
**522.22 Conductor Ampacity.**

Conductors ~~Ampacities for conductors~~ sized 16 AWG and smaller shall ~~not exceed the continuous current values provided be as specified~~ in Table 522.22.

Table 522.22 Conductor Ampacity Based on Copper Conductors with 60°C and 75°C Insulation in an Ambient Temperature of 30°C

<u>Conductor Size</u>	<u>Ampacity</u>	
	<u>60°C</u>	<u>75°C</u>
30	—	0.5
28	—	0.8
26	—	1
24	2	2
22	3	3
20	5	5
18	7	7
16	10	10

**Notes:**

1. For ambient temperatures other than 30°C, use Table 310.15(B)(2)(a) temperature correction factors.
2. Ampacity ~~adjustment~~ for conductors with 90°C or greater insulation shall be based on ampacities in the 75°C column.

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

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**Zip:**

**Submittal Date:** Fri Jan 19 13:59:58 EST 2018

Make Editorial Changes  
Based on Committee Text

**Committee Statement and Meeting Notes**

**Committee Statement:** The revision adds clarity to the requirement to help the user of the NEC understand that the ampacity of the specified conductors must not exceed those given in the associated table.

**Response Message:**

[Public Input No. 2143-NFPA 70-2017 \[Section No. 522.22\]](#)

**First Revision No. 8842-NFPA 70-2018 [ Section No. 522.24(B)(3) ]****(3) In a Manhole.**

Control circuits and power circuits shall be permitted to be installed as underground conductors in a manhole in accordance with one of the following:

- (1) The power or control circuit conductors are in a metal-enclosed cable or Type UF cable.
- (2) The conductors are permanently separated from the power conductors by a continuous firmly fixed nonconductor, such as flexible tubing, in addition to the insulation on the wire.
- (3) The conductors are permanently and effectively separated from the power conductors and securely fastened to racks, insulators, or other approved supports.
- (4) In cable trays, where the control circuit conductors and power conductors not functionally associated with them are separated by a solid fixed barrier of a material compatible with the cable tray, or where the power or control circuit conductors are in a metal-enclosed cable.

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Jan 19 14:21:49 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** The word "firmly" is being removed to conform with the NEC Style Manual.

**Response Message:**

**First Revision No. 8844-NFPA 70-2018 [ Section No. 525.20(G) ]****(G) Protection.**

Flexible cords or cables accessible to the public shall be arranged to minimize the tripping hazard and shall be permitted to be covered with nonconductive matting secured to the walkway surface or other approved cable protection method , provided that the matting or other protection method does not constitute a greater tripping hazard than the uncovered cables. It shall be permitted to bury cables. The requirements of 300.5 shall not apply.

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submission Date:** Fri Jan 19 14:39:55 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** If utilized, non-conductive matting must be secured to in place to the walkway surface to minimize tripping hazard. In addition, there are other approved cable protection methods such as cable "crossovers" that are also effective. This section now allows either secured matting or an approved alternate protection method.

**Response Message:**

Public Input No. 3263-NFPA 70-2017 [Section No. 525.20(G)]

**First Revision No. 8845-NFPA 70-2018 [ Section No. 525.21(B) ]****(B) Portable Wiring Inside Tents and Concessions.**

Electrical wiring for lighting, where installed inside of tents and concessions, shall be securely installed and, where subject to physical damage, shall be provided with mechanical protection. All lamps for general illumination shall be protected from accidental breakage by a ~~suitable~~ luminaire or lampholder with a guard.

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submittal Date:** Fri Jan 19 14:44:42 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes****Committee Statement:** The word "suitable" has been deleted to conform to the NEC Style Manual.**Response Message:**

**First Revision No. 8847-NFPA 70-2018 [ Section No. 530.1 ]****530.1 Scope.**

The requirements of this article shall apply to television studios and motion picture studios using either film or electronic cameras, except as provided in 520.1, and exchanges, factories, laboratories, stages, or a portion of the building in which film or tape more than 22 mm ( $\frac{7}{8}$  in.) in width is exposed, developed, printed, cut, edited, rewound, repaired, or stored.

Informational Note: For methods of protecting against cellulose nitrate film hazards, see NFPA 40-2014 [2016](#), *Standard for the Storage and Handling of Cellulose Nitrate Film*.

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Jan 19 14:55:12 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** Informational Note reference to NFPA 40 is being corrected to current edition 2016.

**Response Message:**

**First Revision No. 8849-NFPA 70-2018 [ Section No. 530.16 ]****530.16** Portable Luminaires.

Portable luminaires and work lights shall be equipped with flexible cords, composition or metal-sheathed porcelain sockets, and substantial guards.

*Exception: Portable luminaires used as properties in a motion picture set or television stage set, on a studio stage or lot, or on location shall not be considered to be portable luminaires for the purpose of this section.*

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Jan 19 14:58:22 EST 2018

Make Editorial Changes  
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Text

**Committee Statement and Meeting Notes**

**Committee Statement:** The word "substantial" has been removed to comply with the NEC Style Manual.

**Response Message:**

**First Revision No. 8850-NFPA 70-2018 [ Section No. 530.17(A) ]****(A) Portable Carbon Arc Lamps.**

~~Portable carbon arc Arc~~ lamps shall be ~~substantially constructed~~. ~~The arc shall be~~ provided with an enclosure designed to retain sparks and carbons and to prevent persons or materials from coming into contact with the arc or bare live parts. The enclosures shall be ventilated. All switches shall be of the externally operable type.

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submittal Date:** Fri Jan 19 14:59:58 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes****Committee Statement:** The sentence containing the words "substantially constructed" has been removed to comply with the NEC Style Manual.**Response Message:**



**First Revision No. 8852-NFPA 70-2018 [ Section No. 530.18(E) ]****(E) Plugging Boxes.**

Cables and cords supplied through plugging boxes shall be of copper. Cables and cords smaller than 8 AWG shall be attached to the plugging box by means of a plug containing two cartridge fuses or a 2-pole circuit breaker. The rating of the fuses or the setting of the circuit breaker shall not be over 400 percent of the ~~rated~~ ampacity of the cables or cords as given in the applicable tables of Articles 310 and 400. Plugging boxes shall not be permitted on ac systems.

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submittal Date:** Fri Jan 19 15:02:44 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** The word "rated" has been deleted as it is not appropriate when used in conjunction with "ampacity".

**Response Message:**

[Public Input No. 922-NFPA 70-2017 \[Section No. 530.18\(E\)\]](#)



## First Revision No. 8861-NFPA 70-2018 [ Section No. 530.19(B) ]

### (B) Portable Feeders.

A demand factor of 50 percent of maximum possible connected load shall be permitted for all portable feeders.

Table 530.19(A) Demand Factors for Stage Set Lighting

<u>Portion of Stage Set Lighting Load</u> <u>to Which Demand Factor Applied</u> <u>(volt-amperes)</u>	<u>Feeder Demand Factor</u> <u>(% percent)</u>
First 50,000 or less at	100
From 50,001 to 100,000 at	75
From 100,001 to 200,000 at	60
Remaining over 200,000 at	50

### Submitter Information Verification

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Jan 19 15:18:18 EST 2018

Make Editorial Changes  
Based on Committee  
Text

### Committee Statement and Meeting Notes

**Committee Statement:** The percent symbol is removed and replaced with the word "percent" per the NEC Style Manual, Units of Measure - Display Text.

**Response Message:**

**First Revision No. 8851-NFPA 70-2018 [ Section No. 530.20 ]****530.20** Equipment Grounding Conductor .

Type MC cable, Type MI cable, Type AC cable containing an insulated equipment grounding conductor, metal raceways, and all non-current-carrying metal parts of appliances, devices, and equipment shall be connected to an equipment grounding conductor. This shall not apply to pendant and portable lamps, to portable stage lighting and stage sound equipment, or to other portable and special stage equipment operating at not over 150 volts dc to ground.

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submittal Date:** Fri Jan 19 15:01:42 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes****Committee Statement:** The title of 530.20 has been changed to better reflect the contents of this section.**Response Message:**

Public Input No. 2019-NFPA 70-2017 [Section No. 530.20]

**First Revision No. 8853-NFPA 70-2018 [ Section No. 530.21(B) ]****(B) Interchangeability.**

Plugs and receptacles used in portable professional motion picture and television equipment shall be permitted to be interchangeable for ac or dc use on the same premises, provided they are listed for ac/dc use and marked ~~in a suitable manner~~ to identify the system to which they are connected.

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submission Date:** Fri Jan 19 15:03:48 EST 2018

Make Editorial Changes  
Based on Committee  
Text

**Committee Statement and Meeting Notes****Committee Statement:** The words "in a suitable manner" have been deleted to conform with the NEC Style Manual.**Response Message:**

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SUBJECT TO REVISION - NOT FOR PUBLICATION

**First Revision No. 8855-NFPA 70-2018 [ Section No. 530.22(B) ]****(B) Interchangeability.**

Single-pole separable connectors used in portable professional motion picture and television equipment shall be permitted to be interchangeable for ac or dc use or for different current ratings on the same premises, provided they are listed for ac/dc use and marked ~~in a suitable manner~~ to identify the system to which they are connected.

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submission Date:** Fri Jan 19 15:05:17 EST 2018

Make Editorial Changes  
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Text

**Committee Statement and Meeting Notes****Committee Statement:** The words "in a suitable manner" have been deleted to conform with the NEC Style Manual.**Response Message:**

**First Revision No. 8816-NFPA 70-2018 [ Section No. 540.1 ]****540.1 Scope.**

~~The provisions of this article apply~~ This article applies to motion picture projection rooms, motion picture projectors, and associated equipment of the professional and nonprofessional types using incandescent, carbon arc, xenon, or other light source equipment that develops hazardous gases, dust, or radiation.

Informational Note: For further information, see NFPA 40-2014 2016, *Standard for the Storage and Handling of Cellulose Nitrate Film*.

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submission Date:** Fri Jan 19 12:55:03 EST 2018

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**Committee Statement and Meeting Notes**

**Committee Statement:** The phrase "the provisions of" is unnecessary and redundant and is being deleted to increase usability.

**Response Message:**

**First Revision No. 8858-NFPA 70-2018 [ Section No. 540.10 ]****540.10 Motion Picture Projection Room Required.**

Every professional-type projector shall be located within a projection room. Every projection room shall be of permanent construction, approved for the type of building in which the projection room is located. All projection ports, spotlight ports, viewing ports, and similar openings shall be provided with glass or other approved material so as to completely close the opening. Such rooms shall not be considered as hazardous (classified) locations as defined in Article 500.

Informational Note: For further information on protecting openings in projection rooms handling cellulose nitrate motion picture film, see NFPA *101-2015 2018*, *Life Safety Code*.

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

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**Submittal Date:** Fri Jan 19 15:13:44 EST 2018

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**Committee Statement and Meeting Notes**

**Committee Statement:** Informational note reference to NFPA 101 is being corrected to 2018 current edition.

**Response Message:**

**First Revision No. 8860-NFPA 70-2018 [ Section No. 540.11(A)(4) ]**

**(4)** Tight Metal Housings.

Have brushes or sliding contacts enclosed in ~~substantial~~, tight metal housings.

**Submitter Information Verification**

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submittal Date:** Fri Jan 19 15:15:00 EST 2018

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**Committee Statement and Meeting Notes**

**Committee Statement:** The word "substantial" has been removed to comply with the NEC Style Manual.

**Response Message:**

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## First Revision No. 8719-NFPA 70-2018 [ Sections 517.30(A), 517.30(B) ]

### Sections 517.30(A), 517.30(B) SEE ATTACHED FOR CHANGES

#### (A) Two Independent Power Sources.

Essential electrical systems shall have a minimum of the following two independent sources of power: a normal source generally supplying the entire electrical system and one or more alternate source(s) for use when the normal source is interrupted. [99:6.4.1.1.4]

#### (B) Types of Power Sources.

##### (1) Generating Units.

Where the normal source consists of generating units on the premises, the alternate source shall be either another generating set or an external utility service. [99:6.4.1.1.5]

##### (2) Fuel Cell Systems.

Fuel cell systems shall be permitted to serve as the alternate source for all or part of an essential electrical system, provided the following conditions apply:

- (1) Installation of fuel cells shall comply with the requirements in Parts I through VII of Article 692 for 1000 volts or less and Part VIII for over 1000 volts.

Informational Note: For information on installation of stationary fuel cells, see NFPA 853-2015, *Standard for Installation of Stationary Fuel Cell Power Systems*. [99:6.4.1.1.7]

- (2) N + 1 units shall be provided where N units have sufficient capacity to supply the demand loads of the portion of the system served. [99:6.4.1.7.2]
- (3) System shall be able to assume loads within 10 seconds of loss of normal power source.
- (4) System shall have a continuing source of fuel supply, together with sufficient on-site fuel storage for the essential system type.
- (5) A connection shall be provided for a portable diesel generator to supply life safety and critical portions of the distribution system. [99:6.4.1.1.7.5(1) through (5)]
- (6) Fuel cell systems shall be listed for emergency system use.

### Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
70_FR8719_517.30_A_B_.docx	For staff use	✓

### Submitter Information Verification

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

**State:**

**Zip:**

**Submission Date:** Thu Jan 18 14:49:44 EST 2018

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### Committee Statement and Meeting Notes

**Committee Statement:** Extracted material from NFPA 99-2018 was updated to the current language and references for 517.30.

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JANUARY 8 - 20, 2018 - SUBJECT TO REVISION - NOT FOR PUBLICATION

Battery systems are accepted Essential Electrical System Source in accordance with NFPA 99 6.7.1.3 and NFPA 111.

The requirement for listed fuel cell systems was deleted because listing requirements are covered in NFPA 853.

**Response**

**Message:**

[Public Input No. 3826-NFPA 70-2017 \[Section No. 517.30\(B\)\]](#)

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**First Revision No. 8785-NFPA 70-2018 [ Sections 517.61(A)(5), 517.61(A)(6) ]****Sections 517.61(A)(5), 517.61(A)(6)****(5) Receptacles and Attachment Plugs.**

Receptacles and attachment plugs in a hazardous (classified) location(s) shall be listed for use in Class I, Group C hazardous (classified) locations and shall have provision for the connection of a an equipment grounding conductor.

**(6) Flexible Cord Type.**

Flexible cords used in hazardous (classified) locations for connection to portable utilization equipment, including lamps operating at more than 8 volts between conductors, shall be of a type approved for extra-hard usage in accordance with Table 400.4 and shall include an additional equipment grounding conductor for grounding .

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submittal Date:** Fri Jan 19 09:55:17 EST 2018

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**Committee Statement and Meeting Notes**

**Committee Statement:** Use of the term "Equipment Grounding Conductor" is correct. The term "grounding conductor" is one that is no longer defined. As part of a Correlating Committee Task Force activity on grounding and bonding in general, this term and its related definition was removed from the NEC during the 2008 NEC cycle.

**Response Message:**

Public Input No. 2404-NFPA 70-2017 [Sections 517.61(A)(5), 517.61(A)(6)]



## First Revision No. 8846-NFPA 70-2018 [ Sections Part IV., 525.30 ]

### Sections Part IV., 525.30

#### Part IV.— Equipment Grounding and Bonding

#### 525.30 Equipment Bonding.

The following equipment connected to the same source shall be bonded:

- (1) Metal raceways and metal-sheathed cable
- (2) Metal enclosures of electrical equipment
- (3) Metal frames and metal parts of portable structures, trailers, trucks, or other equipment that contain or support electrical equipment

~~The equipment grounding conductor. Where the metal frames or parts of the circuit supplying the equipment in items (1), (2) or (3) that is~~ are likely to energize the metal frame or part become energized in the event of a fault, the equipment grounding conductor of the supply circuit shall be permitted to serve as the bonding means.

### Submitter Information Verification

**Submitter Full Name:** NEC-CMP Panel 15

**Organization:** [ Not Specified ]

**Street Address:**

**City:**

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**Zip:**

**Submittal Date:** Fri Jan 19 14:52:42 EST 2018

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### Committee Statement and Meeting Notes

**Committee Statement:** Addition of the word “equipment” to the title of Part IV better covers the contents of 525.30 and 525.31. The word “bonding” must remain in the part title because of the content of 525.30, which is specific to bonding and not grounding. The “word” conductor cannot be added to the part title, since 525.30 and 525.31 cover material beyond the grounding conductor.

In addition, the Panel re-worded the last sentence of 525.30 to improve clarity and readability.

**Response Message:**

**First Revision No. 8837-NFPA 70-2018 [ Sections Part VII., 520.81 ]****Sections Part VII., 520.81****Part VII. Equipment Grounding Conductor****520.81 Equipment Grounding Conductor .**

All metal raceways and metal-sheathed cables shall be connected to an equipment grounding conductor. The metal frames and enclosures of all equipment, including border lights and portable luminaires, shall be connected to an equipment grounding conductor.

**Submitter Information Verification****Submitter Full Name:** NEC-CMP Panel 15**Organization:** [ Not Specified ]**Street Address:****City:****State:****Zip:****Submittal Date:** Fri Jan 19 13:54:07 EST 2018

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Based on Committee  
Text

**Committee Statement and Meeting Notes**

**Committee Statement:** The title of Part VII and section 520.81 have been changed to reflect the contents of that section.

**Response Message:**

Public Input No. 2015-NFPA 70-2017 [Sections Part VII., 520.81]