NFPA 70®

National Electrical Code®

International Electrical Code® Series

NFPA®

Code | 2026

NFPA 70®

National Electrical Code®

2026 Edition

NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
An International Codes and Standards Organization

IMPORTANT NOTE ABOUT THE SHADING IN THE NATIONAL ELECTRICAL CODE®, 2026 EDITION!

The structure of NFPA 70®, National Electrical Code® (NEC®), which was first introduced in 1937, plays a critical role for personnel in learning, understanding, applying, and enforcing the requirements established within this regulatory code. While the current structure has provided tremendous success and stability—and continues to be used globally by engineers, contractors, electricians, and training programs—the time has come to update its structure to help electrical professionals learn and quickly apply and inspect new and uniquely configured electrical systems.

Modernizing the existing document structure enables the NEC to continue to support ever-evolving electrical infrastructure configurations and technological advancements. A revised NEC organizational structure will support ease of learning, understanding, and applying the NEC requirements in a new, rapidly advancing energy landscape.

In anticipation of these proposed structural changes being implemented, digital tagging or linking in the production of this 2026 edition may display shading in areas (primarily in lists) not affected by technical changes.

To view complete revision details made to the National Electrical Code, 2026 edition, refer to the First and Second Draft Reports located in the archived revision information section available at **nfpa.org/70**.

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NFPA 70®

National Electrical Code®

2026 Edition

This edition of *NFPA 70, National Electrical Code*, was prepared by the National Electrical Code Committee and acted on by the NFPA membership during the 2025 NFPA Technical Meeting held June 19. It was issued by the Standards Council on August 20, 2025, with an effective date of September 9, 2025, and supersedes all previous editions.

This *Code* was issued with Tentative Interim Amendments (TIAs) and an errata that impacted the following: 240.86(C), 430.132, 500.30(A), 501.15(B)(2), 505.30(A), 506.30(A), 680.21(C), and 690.12(C) have been issued and incorporated into the *Code*. For more information on TIAs, see www.nfpa.org/70 and Section 5 of the *Regulations Governing the Development of NFPA Standards* available at www.nfpa.org/regs.

This edition of *NFPA 70* was approved as an American National Standard on September 9, 2025.

History and Development of the *National Electrical Code®*

The National Fire Protection Association has acted as sponsor of the *National Electrical Code* since 1911. The original *Code* document was developed in 1897 as a result of the united efforts of various insurance, electrical, architectural, and allied interests.

In accordance with the *Regulations Governing the Development of NFPA Standards*, a *National Electrical Code* first draft report containing proposed amendments to the 2023 *National Electrical Code* was published by NFPA in July 2024. This report recorded the actions of the various code-making panels and the correlating committee on the National Electrical Code Committee on each public input and first revision that had been made to revise the 2023 *Code*. The report was published at www.nfpa.org/70. Following the close of the public comment period, the code-making panels met, acted on each comment, and created some second revisions, which were reported to the correlating committee. NFPA published the *National Electrical Code* second draft report in March 2025, which recorded the actions of the code-making panels and the correlating committee on the public comments submitted on the National Electrical Code Committee first draft report. The *National Electrical Code* first and second draft reports were presented to the 2025 June Association Technical Meeting for adoption.

NFPA has an Electrical Section that provides an opportunity for NFPA members interested in electrical safety to become better informed and to contribute to the development of the *National Electrical Code* and other NFPA electrical standards. At the Electrical Section business meeting held at the 2025 NFPA Conference and Expo, section members had the opportunity to discuss and review the report of the National Electrical Code Committee prior to the adoption of this edition of the *Code* by the association at its 2025 June Technical Meeting.

This 57th edition supersedes all other previous editions, supplements, and printings dated 1897, 1899, 1901, 1903, 1904, 1905, 1907, 1909, 1911, 1913, 1915, 1918, 1920, 1923, 1925, 1926, 1928, 1930, 1931, 1933, 1935, 1937, 1940, 1942, 1943, 1947, 1949, 1951, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1962, 1965, 1968, 1971, 1975, 1978, 1981, 1984, 1987, 1990, 1993, 1996, 1999, 2002, 2005, 2008, 2011, 2014, 2017, 2020, and 2023.

This *Code* is purely advisory as far as NFPA is concerned. It is made available for a wide variety of both public and private uses in the interest of life and property protection. These include both use in law and for regulatory purposes and use in private self-regulation and standardization activities such as insurance underwriting, building and facilities construction and management, and product testing and certification.

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NATIONAL ELECTRICAL CODE COMMITTEE

Committee Scope: This Committee shall have primary responsibility for documents on minimizing the risk of electricity as a source of electric shock and as a potential ignition source of fires and explosions. It shall also be responsible for text to minimize the propagation of fire and explosions due to electrical installations.

These lists represent the membership at the time the Committee was balloted on the final text of this edition. Since that time, changes in the membership may have occurred.

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Code-Making Panel No. 6

Articles 310, 320, 322, 324, 326, 328, 330, 332, 334, 336, 337, 338, 340, 382, 394, 396, 398, 400, 402, Chapter 9 Tables 5, 5A, 8, 9, Annex B, Annex D Example D7

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Articles 120 Parts VII–IX, 545, 547, 550, 551, 552, 555, 604, 675, 682, Annex D Examples D11 and D12

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Code-Making Panel No. 8

Articles 312, 314 Parts I, II, IV, 342, 344, 348, 350, 352, 353, 354, 355, 356, 358, 360, 362, 366, 368 Parts I–III, 369, 370, 371, 372, 374, 376, 378, 380, 384, 386, 388, 390, 392, Chapter 9 Tables 1, 2, 4, Annex C, Annex D Example D13

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Code-Making Panel No. 9

Articles 245, 265, 266, 267, 268, 305, 314 Part III, 315, 368 Part IV, 395, 450, 460 Part III, 470 Part III, 495

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Articles 409, 430, 440, 460 Parts I, II, 470 Parts I, II, Annex D Example D8

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Articles 610, 620, 624, 625, 626, 630, 640, 645, 646, 647, 650, 660, 665, 668, 669, 670, 685, Annex D Examples D9, D10

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Articles 130, 445, 455, 480, 695, 700, 701, 702, 706, 708, 712, Annexes F, G

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Code-Making Panel No. 14

Articles 500, 501, 502, 503, 504, 505, 506, 510, 511, 512, 513, 514, 515, 516, Chapter 9 Table 13

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User (U): A representative of an entity that is subject to the provisions of the standard or that voluntarily uses the standard.

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Insurance (I): A representative of an insurance company, broker, agent, bureau, or inspection agency.

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NOTE 1: "Standard" connotes code, standard, recommended practice, or guide.

NOTE 2: A representative includes an employee.

NOTE 3: While these classifications will be used by the Standards Council to achieve a balance for Technical Committees, the Standards Council may determine that new classifications of member or unique interests need representation in order to foster the best possible Committee deliberations on any project. In this connection, the Standards Council may make such appointments as it deems appropriate in the public interest, such as the classification of "Utilities" in the National Electrical Code Committee.

NOTE 4: Representatives of subsidiaries of any group are generally considered to have the same classification as the parent organization.

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NFPA 70

National Electrical Code

2026 Edition

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ARTICLE 90
Introduction

90.1 Scope. This article covers use and application, arrangement, and enforcement of this code. It also covers the expression of mandatory, permissive, and nonmandatory text, provides guidance on the examination of equipment and on wiring planning, and specifies the use and expression of measurements.

90.2 Scope and Application of Document.

N **(A) Document Scope.**

Δ **(1) Covered.** This code covers the installation and removal of electrical conductors, equipment, and raceways; signaling and communications conductors, equipment, and raceways; and optical fiber cables for the following:

(1) Public and private premises, including buildings, structures, mobile homes, recreational vehicles, and floating buildings
(2) Yards, lots, parking lots, carnivals, and industrial substations
(3) Installations of conductors and equipment that connect to the supply of electricity
(4) Installations used by the electric utility, such as office buildings, warehouses, garages, machine shops, and recreational buildings, that are not an integral part of a generating plant, substation, or control center
(5) Installations supplying shore power to ships and watercraft in marinas and boatyards, including monitoring of leakage current
(6) Installations used to export electric power from vehicles to premises wiring or for bidirectional current flow

Δ **(2) Not Covered.** This code does not cover the following:

(1) Installations in ships, watercraft other than floating buildings, railway rolling stock, aircraft, or automotive vehicles other than mobile homes and recreational vehicles

Informational Note: Although the scope of this code indicates that the code does not cover installations in ships, portions of this code are incorporated by reference into Title 46, Code of Federal Regulations, Parts 110–113.

(2) Installations underground in mines and self-propelled mobile surface mining machinery and its attendant electrical trailing cable
(3) Installations of railways for generation, transformation, transmission, energy storage, or distribution of power used exclusively for operation of rolling stock or installations used exclusively for signaling and communications purposes
(4) Installations of communications equipment under the exclusive control of communications utilities located outdoors or in building spaces used exclusively for such installations
(5) Installations under the exclusive control of an electric utility where such installations
   a. Consist of service drops or service laterals, and associated metering, or
   b. Are on property owned or leased by the electric utility for the purpose of communications, metering, generation, control, transformation, transmission, energy storage, or distribution of electric energy, or
   c. Are located in legally established easements or rights-of-way, or
   d. Are located by other written agreements either designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations. These written agreements shall be limited to installations for the purpose of communications, metering, generation, control, transformation, transmission, energy storage, or distribution of electric energy where legally established easements or rights-of-way cannot be obtained. These installations shall be limited to federal lands, Native American reservations through the US Department of the Interior Bureau of Indian Affairs, military bases, lands controlled by port authorities and state agencies and departments, and lands owned by railroads.

Informational Note to (4) and (5): Examples of utilities can include those entities that are typically designated or recognized by governmental law or regulation by public service/utility commissions and that install, operate, and maintain electric supply (such as generation, transmission, or distribution systems) or communications systems (such as telephone, CATV, Internet, satellite, or data services). Utilities could be subject to compliance with codes and standards covering their regulated activities as adopted under governmental law or regulation. Additional information can be found through consultation with the governmental bodies, such as state regulatory commissions, the Federal Energy Regulatory Commission, and the Federal Communications Commission.

(B) Practical Safeguarding. The purpose of this code is the practical safeguarding of persons and property from hazards arising from the use of electricity. This code is not intended as

a design specification or an instruction manual for untrained persons.

(C) Adequacy. This code contains provisions that are considered necessary for safety. Compliance therewith and proper maintenance result in an installation that is essentially free from hazard but not necessarily efficient, convenient, or adequate for good service or future expansion of electrical use.

Informational Note: Hazards often occur because of overloading of wiring systems by methods or usage not in conformity with this code. This occurs because initial wiring did not provide for increases in the use of electricity. An initial adequate installation and reasonable provisions for system changes provide for future increases in the use of electricity.

(D) Relation to Other International Standards. The requirements in this code address the fundamental principles of protection for safety contained in Section 131 of International Electrotechnical Commission Standard 60364-1, *Low-voltage Electrical Installations – Part 1: Fundamental Principles, Assessment of General Characteristics, Definitions.*

Informational Note: See IEC 60364-1, *Low-voltage Electrical Installations – Part 1: Fundamental Principles, Assessment of General Characteristics, Definitions*, Section 131, for fundamental principles of protection for safety that encompass protection against electric shock, protection against thermal effects, protection against overcurrent, protection against fault currents, and protection against overvoltage. All of these potential hazards are addressed by the requirements in this code.

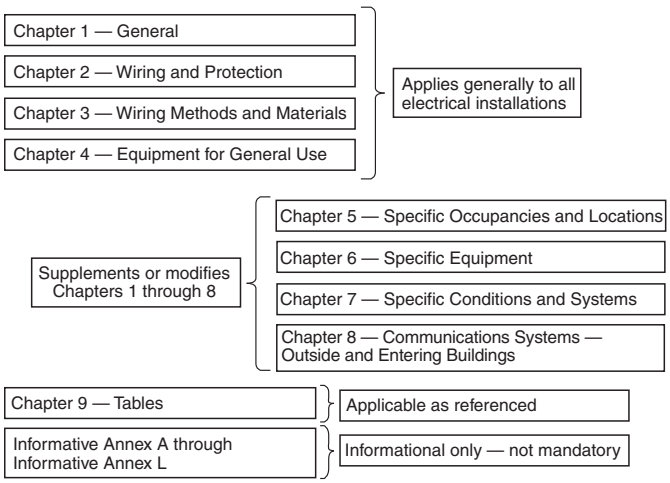
•Δ **90.3 Code Arrangement.** This code is divided into the introduction and nine chapters, as shown in Figure 90.3. Chapters 1 through 4 apply generally. Chapters 5 through 8 may supplement or modify the requirements in Chapters 1 through 8.

Chapter 9 consists of tables that are applicable as referenced.

Informative annexes are not part of the requirements of this code but are included for informational purposes only.

90.4 Enforcement.

(A) Application. This code is intended to be suitable for mandatory application by governmental bodies that exercise legal jurisdiction over electrical installations, including signaling and communications systems, and for use by insurance inspectors.



Δ **FIGURE 90.3 Code Arrangement.**

(B) Interpretations. The authority having jurisdiction for enforcement of the code has the responsibility for making interpretations of the rules, for deciding on the approval of equipment and materials, and for granting the special permission contemplated in a number of the rules.

(C) Specific Requirements and Alternative Methods. By special permission, the authority having jurisdiction may waive specific requirements in this code or permit alternative methods where it is assured that equivalent objectives can be achieved by establishing and maintaining effective safety.

(D) New Products, Constructions, or Materials. This code may require new products, constructions, or materials that may not yet be available at the time the code is adopted. In such event, the authority having jurisdiction may permit the use of the products, constructions, or materials that comply with the most recent previous edition of this code adopted by the jurisdiction.

Informational Note: See Informative Annex H, Administration and Enforcement, for a model of guidelines that can be used to create an electrical inspection and enforcement program and to adopt *NFPA 70, National Electrical Code.*

90.5 Mandatory Rules, Permissive Rules, and Explanatory Material.

(A) Mandatory Rules. Mandatory rules of this code are those that identify actions that are specifically required or prohibited and are characterized by the use of the terms *shall* or *shall not.*

(B) Permissive Rules. Permissive rules of this code are those that identify actions that are allowed but not required, are normally used to describe options or alternative methods, and are characterized by the use of the terms *shall be permitted* or *shall not be required.*

(C) Explanatory Material. Explanatory material, such as references to other publications, references to related sections of this code, or information related to a code rule, is included in this code in the form of informational notes or an informative annex. Unless a reference to a publication includes a date or edition, the reference is to be considered the date or edition contained in Informative Annex A. Such notes are informational only and are not enforceable as requirements of this code.

Brackets containing section references to another NFPA publication are for informational purposes only and are provided as a guide to indicate the source of the extracted text. These bracketed references immediately follow the extracted text.

Informational Note: The format and language used in this code follows guidelines established by NFPA and published in the *NEC Style Manual.* Copies of this manual can be obtained from NFPA.

(D) Informative Annexes. Nonmandatory information relative to the use of the *NEC* is provided in informative annexes. Informative annexes are not part of the enforceable requirements of the *NEC*, but are included for information purposes only.

90.6 Formal Interpretations. To promote uniformity of interpretation and application of this code formal interpretation procedures have been established and are found in the *Regulations Governing the Development of NFPA Standards.*

Δ **90.7 Examination of Equipment for Safety.** For specific items of equipment and materials referred to in this code, examinations for safety made under standard conditions provide a basis for approval where the record is made generally available through promulgation by organizations properly equipped and qualified for experimental testing, inspections of the run of goods at factories, and service-value determination through field inspections.

It is the intent of this code that factory-installed internal wiring or the construction of equipment need not be inspected at the time of installation of the equipment, except to detect alterations or damage, if the equipment has been listed by a qualified electrical testing laboratory in accordance with 110.3(C).

Informational Note No. 1: See Article 100 for definitions of *listed* and *reconditioned*.

Informational Note No. 2: See Informative Annex A for a list of product safety standards that are compatible with this code.

90.8 Wiring Planning.

(A) Future Expansion and Convenience. Plans and specifications that provide ample space in raceways, spare raceways, and additional spaces allow for future increases in electric power and communications circuits. Distribution centers located in readily accessible locations provide convenience and safety of operation.

(B) Number of Circuits in Enclosures. It is elsewhere provided in this code that the number of circuits confined in a single enclosure be varyingly restricted. Limiting the number of circuits in a single enclosure minimizes the effects from a short circuit or ground fault.

90.9 Units of Measurement.

(A) Measurement System of Preference. For the purpose of this code, metric units of measurement are in accordance with the modernized metric system known as the International System of Units (SI).

(B) Dual System of Units. SI units shall appear first, and inch-pound units shall immediately follow in parentheses. Conversion from inch-pound units to SI units shall be based on hard conversion except as provided in 90.9(C).

Exception: The tables located in Informative Annex C shall be permitted to list the trade sizes before SI units.

Δ **(C) Permitted Uses of Soft Conversion.** The cases given in 90.9(C)(1) through 90.9(C)(4) shall not be required to use hard conversion and shall be permitted to use soft conversion.

(1) Trade Sizes. Where the actual measured size of a product is not the same as the nominal size, trade size designators shall be used rather than dimensions. Trade practices shall be followed in all cases.

(2) Extracted Material. Where material is extracted from another standard, the context of the original material shall not be compromised or violated. Any editing of the extracted text shall be confined to making the style consistent with that of the *NEC*.

(3) Industry Practice. Where industry practice is to express units in inch-pound units, the inclusion of SI units shall not be required.

(4) Safety. Where a negative impact on safety would result, soft conversion shall be used.

(D) Compliance. Conversion from inch-pound units to SI units shall be permitted to be an approximate conversion. Compliance with the numbers shown in either the SI system or the inch-pound system shall constitute compliance with this code.

Informational Note No. 1: Hard conversion is considered a change in dimensions or properties of an item into new sizes that might or might not be interchangeable with the sizes used in the original measurement. Soft conversion is considered a direct mathematical conversion and involves a change in the description of an existing measurement but not in the actual dimension.

Informational Note No. 2: See IEEE/ASTM SI 10-2016, *Standard for the Use of the International System of Units (SI): The Modern Metric System*, for SI conversions.

Chapter 1 General

ARTICLE 100 Definitions

Δ **Scope.** This article contains only those definitions essential to the application of this code. It is not intended to include commonly defined general terms or commonly defined technical terms from related codes and standards. An article number in parentheses following the definition indicates that the definition only applies to that article.

Informational Note: A definition that is followed by a reference in brackets has been extracted from one of the following standards. Only editorial changes were made to the extracted text to make it consistent with this code.

(1) NFPA 30A, *Code for Motor Fuel Dispensing Facilities and Repair Garages*
(2) NFPA 33, *Standard for Spray Application Using Flammable or Combustible Materials*
(3) NFPA 75, *Standard for the Fire Protection of Information Technology Equipment*
(4) NFPA 79, *Electrical Standard for Industrial Machinery*
(5) NFPA 99, *Health Care Facilities Code*
(6) NFPA 101®, *Life Safety Code®*
(7) NFPA 110, *Standard for Emergency and Standby Power Systems*
(8) NFPA 303, *Fire Protection Standard for Marinas and Boatyards*
(9) NFPA 307, *Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves*
(10) NFPA 499, *Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*
(11) NFPA 790, *Standard for Competency of Third-Party Field Evaluation Bodies*
(12) NFPA 1192, *Standard on Recreational Vehicles*

Accessible (as applied to equipment). Capable of being reached for operation, renewal, and inspection. (CMP-1)

Accessible (as applied to wiring methods). Capable of being removed or exposed without damaging the building structure or finish or not permanently closed in or blocked by the structure, other electrical equipment, other building systems, or finish of the building. (CMP-1)

Δ **Accessible, Readily. (Readily Accessible)** Capable of being reached quickly for operation, renewal, or inspection without those requiring ready access to take actions such as to use tools other than keys, to climb over or under, to remove obstacles, or to resort to portable ladders. (CMP-1)

Informational Note: Use of keys is a common practice under controlled or supervised conditions and a common alternative to the ready access requirements under such supervised conditions as provided elsewhere in the *NEC*.

Adapter. A device used to adapt a circuit from one configuration of an attachment plug or receptacle to another configuration with the same current rating. (520) (CMP-15)

Adjustable Speed Drive. Power conversion equipment that provides a means of adjusting the speed of an electric motor. (CMP-11)

Informational Note: A variable frequency drive is one type of electronic adjustable speed drive that controls the rotational speed of an ac electric motor by controlling the frequency and voltage of the electrical power supplied to the motor.

Adjustable Speed Drive System. A combination of an adjustable speed drive, its associated motor(s), and auxiliary equipment. (CMP-11)

Aircraft Painting Hangar. An aircraft hangar constructed for the express purpose of spraying, coating, and/or dipping applications and provided with dedicated ventilation supply and exhaust. (CMP-14)

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Δ **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 the 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) 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:**3.3.205.1] (517) (CMP-15)

Ampacity. The maximum current, in amperes, that a conductor can carry continuously under the conditions of use without exceeding its temperature rating. (CMP-6)

Amplifier (Audio Amplifier) (Pre-Amplifier). Electronic equipment that increases the current or voltage, or both, of an audio signal intended for use by another piece of audio equipment. Amplifier is the term used to denote an audio amplifier. (640) (CMP-12)

Δ **Appliance.** Utilization equipment, generally other than industrial, that is normally built in a standardized size or type and is installed or connected as a unit to perform one or more functions. (CMP-17)

Informational Note: Examples of appliances are clothes washers, air conditioners, food mixers, and deep fryers.

Applicator. The device used to transfer energy between the output circuit and the object or mass to be heated. (665) (CMP-12)

Approved. Acceptable to the authority having jurisdiction. (CMP-1)

Arc-Fault Circuit Interrupter (AFCI). A device intended to provide protection from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the circuit when an arc fault is detected. (CMP-2)

Array (PV Array) (Solar PV Array). A mechanically and electrically integrated grouping of solar PV modules with mounting system, including any attached system components such as inverters or dc-to-dc converters and attached associated wiring. (690) (CMP-4)

N Artificially Ventilated Room "v". A room volume protected by artificial ventilation and of sufficient size to permit the entry of a person who might occupy the room. (CMP-14)

Informational Note: see ANSI/UL 60079-13, *Explosive Atmospheres — Part 13: Equipment Protection by Pressurized Room "p" and Artificially Ventilated Room "v"*, for information on the requirements for rooms intended for human entry where artificial ventilation is used as a means of reducing the risk of explosion.

Askarel. A generic term for a group of nonflammable synthetic chlorinated hydrocarbons used as electrical insulating media. (CMP-9)

Informational Note: Askarels of various compositional types are used. Under arcing conditions, the gases produced, while consisting predominantly of noncombustible hydrogen chloride, can include varying amounts of combustible gases, depending on the askarel type.

Δ Associated Apparatus. Apparatus in which the circuits are not necessarily intrinsically safe themselves but that affects the energy in the intrinsically safe circuits and is relied on to maintain intrinsic safety. Such apparatus is one of the following:

(1) Electrical apparatus that has an alternative type of protection for use in the appropriate hazardous (classified) location
(2) Electrical apparatus not so protected that shall not be used within a hazardous (classified) location

(CMP-14)

Informational Note No. 1: Associated apparatus has identified intrinsically safe connections for intrinsically safe apparatus and also might have connections for nonintrinsically safe apparatus.

Informational Note No. 2: An example of associated apparatus is an intrinsic safety barrier, which is a network designed to limit the energy (voltage and current) available to the protected circuit in the hazardous (classified) location under specified fault conditions.

Informational Note No. 3: See ANSI/UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*; ANSI/UL 60079-11, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety "i"*; and ANSI/ISA RP 12.06.01, *Recommended Practice for Wiring Methods for Hazardous (Classified) Locations Instrumentation — Part 1: Intrinsic Safety*, for additional information.

Δ Associated Nonincendive Field Wiring Apparatus. Apparatus in which the circuits are not necessarily nonincendive themselves but that affects the energy in nonincendive field wiring circuits and is relied on to maintain nonincendive energy levels. Such apparatus is one of the following:

(1) Electrical apparatus that has an alternative type of protection for use in the appropriate hazardous (classified) location
(2) Electrical apparatus not so protected that shall not be used within a hazardous (classified) location

(CMP-14)

Informational Note No. 1: Associated nonincendive field wiring apparatus has designated associated nonincendive field wiring apparatus connections for nonincendive field wiring apparatus and also might have connections for other electrical apparatus.

Informational Note No. 2: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

Attachment Fitting, Weight-Supporting (WSAF) (Weight-Supporting Attachment Fitting). A device that, by insertion into a weight-supporting ceiling receptacle, establishes a connection between the conductors of the attached utilization equipment and the branch-circuit conductors connected to the weight-supporting ceiling receptacle. (CMP-18)

Informational Note No. 1: A weight-supporting attachment fitting is different from an attachment plug because no cord is associated with the fitting. A weight-supporting attachment fitting in combination with a weight-supporting ceiling receptacle secures the associated utilization equipment in place and supports its weight.

Informational Note No. 2: See ANSI/NEMA WD 6, *American National Standard for Wiring Devices — Dimensional Specifications*, for the standard configuration of weight-supporting attachment fittings and related weight-supporting ceiling receptacles.

Attachment Plug (Plug Cap) (Plug). A device that, by insertion in a receptacle, establishes a connection between the conductors of the attached flexible cord and the conductors connected permanently to the receptacle. (CMP-18)

Audio Autotransformer. A transformer with a single winding and multiple taps intended for use with an amplifier loudspeaker signal output. (640) (CMP-12)

Audio Signal Processing Equipment (Audio Equipment). Electrically operated equipment that produces, processes, or both, electronic signals that, when appropriately amplified and reproduced by a loudspeaker, produce an acoustic signal within the range of normal human hearing (typically 20–20 kHz). Within Article 640, the terms equipment and audio equipment are assumed to be equivalent to audio signal processing equipment. (640) (CMP-12)

Informational Note: This equipment includes, but is not limited to, loudspeakers; headphones; pre-amplifiers; microphones and their power supplies; mixers; MIDI (musical instrument digital interface) equipment or other digital control systems; equalizers, compressors, and other audio signal processing equipment; and audio media recording and playback equipment, including turntables, tape decks and disk players (audio and multimedia), synthesizers, tone generators, and electronic organs. Electronic organs and synthesizers may have integral or separate amplification and loudspeakers. With the exception of amplifier outputs, virtually all such equipment is used to process signals (using analog or digital techniques) that have nonhazardous levels of voltage or current.

Audio System. The totality of all equipment and interconnecting wiring used to fabricate a fully functional audio signal processing, amplification, and reproduction system. (640) (CMP-12)

Audio Transformer. A transformer with two or more electrically isolated windings and multiple taps intended for use with an amplifier loudspeaker signal output. (640) (CMP-12)

Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure. (CMP-1)

Informational Note: The phrase "authority having jurisdiction," or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or

health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

Automatic. Performing a function without the necessity of human intervention. (CMP-1)

Bathroom. An area including a sink with one or more of the following: a toilet, a urinal, a tub, a shower, a bidet, or similar plumbing fixtures. (CMP-2)

Battery. A single cell or a group of cells connected together electrically in series, in parallel, or a combination of both. (CMP-13)

Battery, Flow. (Flow Battery) An energy storage component that stores its active materials in the form of one or two electrolytes external to the reactor interface. When in use, the electrolytes are transferred between reactor and storage tanks. (706) (CMP-13)

Informational Note: Three commercially available flow battery technologies are zinc air, zinc bromine, and vanadium redox, sometimes referred to as *pumped electrolyte ESS*.

Battery, Sealed. (Sealed Battery) A battery that has no provision for the routine addition of water or electrolyte or for external measurement of electrolyte specific gravity and might contain pressure relief venting. (CMP-13)

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Battery-Powered Lighting Units. Individual unit equipment for backup illumination consisting of a rechargeable battery; a battery-charging means; provisions for one or more lamps mounted on the equipment, or with terminals for remote lamps, or both; and a relaying device arranged to energize the lamps automatically upon failure of the supply to the unit equipment. (517) (CMP-15)

Berth. The water space to be occupied by a boat or other vessel alongside or between bulkheads, piers, piles, fixed and floating docks, or any similar access structure. [**303:**3.3.2] (555) (CMP-7)

Informational Note: See the definition of *Slip* for additional information.

Bipolar Circuit. A dc circuit that is comprised of two monopole circuits, each having an opposite polarity connected to a common reference point. (CMP-4)

Block. A square or portion of a city, town, or village enclosed by streets and including the alleys so enclosed, but not any street. (800) (CMP-16)

Boatyard. A facility used for constructing, repairing, servicing, hauling from the water, storing (on land and in water), and launching of boats. [**303:**3.3.3] (555) (CMP-7)

Bodies of Water, Artificially Made. (Artificially Made Bodies of Water) Bodies of water that have been constructed or modified to fit some decorative or commercial purpose such as, but not limited to, aeration ponds, fish farm ponds, storm retention basins, treatment ponds, and irrigation (channel) facilities. Water depths may vary seasonally or be controlled. (682) (CMP-7)

Bodies of Water, Natural. (Natural Bodies of Water) Bodies of water such as lakes, streams, ponds, rivers, and other naturally occurring bodies of water, which may vary in depth throughout the year. (682) (CMP-7)

Bonded (Bonding). Connected to establish electrical continuity and conductivity. (CMP-5)

Bonding Conductor (Bonding Jumper). A conductor that ensures the required electrical conductivity between metal parts that are required to be electrically connected. (CMP-5)

N **Bonding Conductor, Grounding Electrode (Grounding Electrode Bonding Jumper). (Grounding Electrode Bonding Conductor)** A conductor, other than the grounding electrode conductor, used to interconnect two or more grounding electrodes to form the grounding electrode system. (CMP-5)

Δ **Bonding Jumper, Equipment (Equipment Bonding Jumper). (Equipment Bonding Conductor)** A component of the effective ground-fault current path that is the connection between two or more portions of the equipment grounding conductor. (CMP-5)

N **Bonding Jumper, Impedance (Impedance Bonding Jumper). (Impedance Bonding Conductor)** The connection in an impedance grounded system between the equipment grounding conductor(s) and the grounding electrode side of the impedance grounding device. (CMP-5)

Δ **Bonding Jumper, Main (Main Bonding Jumper). (Main Bonding Conductor)** A component of the effective ground-fault current path that is the connection between the grounded circuit conductor and the equipment grounding conductor, or the supply-side bonding conductor, or both, at the service equipment. (CMP-5)

Δ **Bonding Jumper, Supply-Side (Supply-Side Bonding Jumper). (Supply-Side Bonding Conductor)** A component of the effective ground-fault current path that is installed on the supply side of a service or within a service equipment enclosure(s), or for a separately derived system, that ensures the required electrical conductivity between metal parts required to be electrically connected. (CMP-5)

Δ **Bonding Jumper, System (System Bonding Jumper). (System Bonding Conductor)** A component of the effective ground-fault current path that is the connection between the grounded circuit conductor and the supply-side bonding conductor, or the equipment grounding conductor, or both, at a separately derived system. (CMP-5)

Border Light. A permanently installed overhead strip light. (520) (CMP-15)

Bottom Shield. A protective layer that is installed between the floor and flat conductor cable (Type FCC) to protect the cable from physical damage and may or may not be incorporated as an integral part of the cable. (324) (CMP-6)

Branch Circuit (Branch-Circuit). The circuit conductors between the final overcurrent protective device (OCPD) protecting the circuit and the outlet(s). (CMP-2)

Branch Circuit, Appliance. (Appliance Branch Circuit) A branch circuit that supplies energy to one or more outlets to which appliances are to be connected and that has no permanently connected luminaires that are not a part of an appliance. (CMP-2)

Branch Circuit, General-Purpose. (General-Purpose Branch Circuit) A branch circuit that supplies two or more receptacles or outlets for lighting and appliances. (CMP-2)

Branch Circuit, Individual. (Individual Branch Circuit) A branch circuit that supplies only one utilization equipment. (CMP-2)

Branch Circuit, Motor. (Motor Branch Circuit) The circuit conductors, including equipment, between the motor branch-circuit short-circuit and ground-fault protective device and an individual motor. (CMP-11)

Branch Circuit, Multiwire. (Multiwire Branch Circuit) A branch circuit that consists of two or more ungrounded conductors that have a voltage between them, and a neutral conductor that has equal voltage between it and each ungrounded conductor of the circuit and that is connected to the neutral conductor of the system. (CMP-2)

Branch-Circuit Selection Current (BCSC). The value in amperes to be used instead of the rated-load current in determining the ratings of motor branch-circuit conductors, disconnecting means, controllers, and branch-circuit short-circuit and ground-fault protective devices wherever the running overload protective device permits a sustained current greater than the specified percentage of the rated-load current. The value of branch-circuit selection current will always be equal to or greater than the marked rated-load current. (440) (CMP-11)

Breakout Assembly. An adapter used to connect a multipole connector containing two or more branch circuits to multiple individual branch-circuit connectors. (520) (CMP-15)

Broadband. Wide bandwidth data transmission that transports multiple signals, protocols, and traffic types over various media types. (CMP-16)

Building. A structure that stands alone or that is separated from adjoining structures by fire walls. (CMP-1)

Building, Floating. (Floating Building) A building that floats on water, is moored in a permanent location, and has a premises wiring system served through connection by permanent wiring to an electrical supply system not located on the premises. (CMP-7)

Building, Manufactured. (Manufactured Building) Any building that is of closed construction and is made or assembled in manufacturing facilities on or off the building site for installation, or for assembly and installation on the building site, other than manufactured homes, mobile homes, park trailers, or recreational vehicles. (545) (CMP-7)

Building Component. Any subsystem, subassembly, or other system designed for use in or integral with or as part of a structure, which can include structural, electrical, mechanical, plumbing, and fire protection systems, and other systems affecting health and safety. (545) (CMP-7)

Building System. Plans, specifications, and documentation for a system of manufactured building or for a type or a system of building components, which can include structural, electrical, mechanical, plumbing, and fire protection systems, and other systems affecting health and safety, and including such variations thereof as are specifically permitted by regulation, and which variations are submitted as part of the building system or amendment thereto. (545) (CMP-7)

Bulkhead. A vertical structural wall, usually of stone, timber, metal, concrete, or synthetic material, constructed along, and generally parallel to, the shoreline to retain earth as an extension of the upland, and often to provide suitable water depth at the waterside face. [**303:**3.3.5] (555) (CMP-7)

Bull Switch. An externally operated wall-mounted safety switch that can contain overcurrent protection and is designed for the connection of portable cables and cords. (530) (CMP-15)

Bundled. Cables or conductors that are tied, wrapped, taped, or otherwise periodically bound together. (520) (CMP-15)

Busbar. A noninsulated conductor electrically connected to the source of supply and physically supported on an insulator providing a power rail for connection to utilization equipment, such as sensors, actuators, A/V devices, low-voltage luminaire assemblies, and similar electrical equipment, for the low-voltage suspended ceiling power distribution system. (393) (CMP-18)

Busbar Support. An insulator that runs the length of a section of suspended ceiling bus rail that serves to support and isolate the busbars of the low-voltage suspended ceiling power distribution system. (393) (CMP-18)

Busway. A raceway consisting of a metal enclosure containing factory-mounted, bare or insulated conductors, which are usually copper or aluminum bars, rods, or tubes. (CMP-8)

Cabinet. An enclosure that is designed for either surface mounting or flush mounting and is provided with a frame, mat, or trim in which a swinging door or doors are or can be hung. (CMP-8)

Δ **Cable, Abandoned. (Abandoned Cable)** Installed cable that is not terminated at equipment other than a termination fitting or a connector and is not identified for future use with a tag. (CMP-3)

Informational Note: See 640.6(B), 645.6(G), 760.25, and 720.25 for requirements covering the removal of abandoned cables.

Cable, Armored (Type AC). (Armored Cable) A fabricated assembly of insulated conductors in a flexible interlocked metallic armor. (CMP-6)

Cable, Circuit Integrity (CI). (Circuit Integrity Cable) Cable(s) marked with the suffix "-CI" used for remote-control, signaling, power-limited, fire alarm, optical fiber, or communications systems that supply critical circuits to ensure survivability for continued circuit operation for a specified time under fire conditions. (CMP-3)

Informational Note: See 772.4 for power circuits installed for survivability.

Cable, Coaxial. (Coaxial Cable) A cylindrical assembly composed of a conductor centered inside a metallic tube or shield, separated by a dielectric material, and usually covered by an insulating jacket. (CMP-3)

Cable, Festoon. (Festoon Cable) Single- and multiple-conductor cable intended for use and installation where flexibility is required. (610) (CMP-12)

Cable, Flat Conductor (Type FCC). (Flat Conductor Cable) Three or more separate flat copper conductors placed horizontally edge-to-edge and enclosed within an insulating assembly. (324) (CMP-6)

Cable, Instrumentation Tray (Type ITC). (Instrumentation Tray Cable) A factory assembly of two or more insulated conductors, with or without an equipment grounding conductor(s), enclosed in a nonmetallic sheath. (CMP-3)

Cable, Integrated Gas Spacer (Type IGS). (Integrated Gas Spacer Cable) A factory assembly of one or more conductors, each individually insulated and enclosed in a loose fit, nonmetallic flexible conduit as an integrated gas spacer cable rated 0 volts through 600 volts. (CMP-6)

N **Cable, Limited-Energy. (Limited-Energy Cable)** A factory assembly of one or more conductors or optical fibers used for any of the following:

(1) Class 2 circuits
(2) Class 3 circuits
(3) Class 4 circuits
(4) Optical fiber systems
(5) Communications circuits
(6) Community antenna television circuits (CATV)
(7) Network-powered broadband low-power communications circuits
(8) Premises communications circuits
(9) Power-limited fire alarm circuits

(CMP-3)

Δ **Cable, Limited-Use. (Limited-Use Cable)** Cables that are intended to be used with protection such as a raceway or for specific restricted applications. (CMP-3)

Informational Note: Limited-use cables are denoted by an "X" suffix, for example Types CL2X or CMX.

Cable, Medium Voltage (Type MV). (Medium Voltage Cable) A single or multiconductor solid dielectric insulated cable rated 2001 volts up to and including 35,000 volts, nominal. (CMP-6)

Cable, Metal Clad (Type MC). (Metal Clad Cable) A factory assembly of one or more insulated circuit conductors with or without optical fiber members enclosed in an armor of interlocking metal tape, or a smooth or corrugated metallic sheath. (CMP-6)

Cable, Metallic Conductor. (Metallic Conductor Cable) A factory assembly of two or more conductors having an overall covering. (CMP-3)

Cable, Mineral-Insulated, Metal-Sheathed (Type MI). (Mineral-Insulated, Metal-Sheathed Cable) A factory assembly of one or more conductors insulated with a highly compressed refractory mineral insulation and enclosed in a liquidtight and gastight continuous copper or alloy steel sheath. (CMP-6)

Cable, Nonmetallic-Sheathed. A factory assembly of two or more insulated conductors enclosed within an overall nonmetallic jacket. (CMP-6)

Cable, Nonmetallic-Sheathed (Type NM). Insulated circuit conductors and a bare, covered, or insulated equipment grounding conductor enclosed within an overall nonmetallic jacket. (CMP-6)

Cable, Nonmetallic-Sheathed (Type NMC). Insulated circuit conductors and a bare, covered, or insulated equipment grounding conductor enclosed within an overall, corrosion resistant, nonmetallic jacket. (CMP-6)

Cable, Optical Fiber. (Optical Fiber Cable) A factory assembly or field assembly of one or more optical fibers having an overall covering. (CMP-16)

Informational Note: A field-assembled optical fiber cable is an assembly of one or more optical fibers within a jacket. The jacket, without optical fibers, is installed in a manner similar to conduit or raceway. Once the jacket is installed, the optical fibers are inserted into the jacket, completing the cable assembly.

Cable, Optical Fiber, Conductive. (Conductive Optical Fiber Cable) A factory assembly of one or more optical fibers having an overall covering and containing non-current-carrying conductive member(s) such as metallic strength member(s), metallic vapor barrier(s), metallic armor, or metallic sheath. (CMP-16)

Cable, Optical Fiber, Hybrid. (Hybrid Optical Fiber Cable) A cable containing optical fibers and current-carrying electrical conductors. (CMP-16)

Cable, Optical Fiber, Nonconductive. (Nonconductive Optical Fiber Cable) A factory assembly of one or more optical fibers having an overall covering and containing no electrically conductive materials. (CMP-16)

Cable, Optical Fiber, Protected. (Protected Optical Fiber Cable) Optical fiber cable protected from releasing optical radiation into the atmosphere during normal operating conditions and foreseeable malfunctions by additional armoring, conduit, cable tray, or raceway. (CMP-14)

Informational Note: See ANSI/UL 60079-28, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*, for additional information.

Cable, Portable Power Feeder. (Portable Power Feeder Cable) One or more flexible shielded insulated power conductors enclosed in a flexible covering rated from 2001 to 25,000 volts. (CMP-6)

Cable, Power and Control Tray (Type TC). (Power and Control Tray Cable) A factory assembly of two or more insulated conductors, with or without associated bare or covered equipment grounding conductors, under a nonmetallic jacket. (CMP-6)

Cable, Power-Limited Tray (Type PLTC). (Power-Limited Tray Cable) A factory assembly of two or more insulated conductors rated at 300 volts, with or without associated bare or insulated equipment grounding conductors, under a nonmetallic jacket. (CMP-3)

Cable, Service. (Service Cable) Service conductors made up in the form of a cable. (CMP-10)

Cable, Service Entrance. (Service Entrance Cable) A single conductor or multiconductor cable provided with an overall covering, primarily used for services. (CMP-6)

Cable, Service Entrance (Type SE). Service-entrance cable having a flame-retardant, moisture-resistant covering. (CMP-6)

Cable, Service Entrance (Type USE). Service-entrance cable, identified for underground use, having a moisture-resistant covering, but not required to have a flame-retardant covering. (CMP-6)

Cable, Type P. A factory assembly of one or more insulated flexible tinned copper conductors, with associated equipment

grounding conductor(s), with or without a braided metallic armor and with an overall nonmetallic jacket. (CMP-6)

Cable, Under Carpet. (Under Carpet Cable) Cables that are intended to be used under carpeting, floor covering, modular tiles, and planks. (722) (CMP-3)

Cable, Underground Feeder and Branch-Circuit (Type UF). (Underground Feeder and Branch-Circuit Cable) A factory assembly of one or more insulated conductors with an integral or an overall covering of nonmetallic material suitable for direct burial in the earth. (CMP-6)

Cable Assembly, Flat (Type FC). (Flat Cable Assembly) An assembly of parallel conductors formed integrally with an insulating material web specifically designed for field installation in surface metal raceway. (CMP-6)

Cable Bundle. A group of cables that are tied together or in contact with one another in a closely packed configuration for at least 1.0 m (40 in.). (CMP-3)

Informational Note: Random or loose installation of individual cables can result in less heating. Combing of the cables can result in less heat dissipation and more signal cross talk between cables.

Cable Connector. A connector designed to join flat conductor cables (Type FCC) without using a junction box. (324) (CMP-6)

Cable Connector [as applied to hazardous (classified) locations]. An electrical device that is part of a cable assembly and that, by insertion of two mating configurations, establishes a connection between the conductors of the cable assembly and the conductors of a fixed piece of equipment. (CMP-14)

Informational Note No. 1: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for information on the use of cable connectors.

Informational Note No. 2: Cable connectors in other than hazardous (classified) locations are referred to as male and female fittings.

Informational Note No. 3: See ANSI/UL 2238, *Cable Assemblies and Fittings for Industrial Control and Signal Distribution*, and ANSI/UL 2237, *Multi-Point Interconnection Power Cable Assemblies for Industrial Machinery*, for examples of standards on male and female fittings in other than hazardous (classified) locations.

Cable Joint. A connection consisting of an insulation system and a connector where two (or more) medium voltage (Type MV) cables are joined together. (CMP-6)

Cable Management System. An apparatus designed to control and organize lengths of cable or cord. (CMP-12)

Cable Routing Assembly. A single channel or connected multiple channels, as well as associated fittings, forming a structural system that is used to support and route communications wires and cables, optical fiber cables, data cables associated with information technology and communications equipment, Class 2, Class 3, Class 4, and Type PLTC cables, and power-limited fire alarm cables in plenum, riser, and general-purpose applications. (CMP-3)

Cable Sheath. A single or multiple layers of a protective covering that holds and protects the conductors or optical fibers, or both, contained inside. (CMP-3)

Cable System, Fire-Resistive. (Fire-Resistive Cable System) A cable and components used to ensure survivability of critical circuits for a specified time under fire conditions. (CMP-3)

Cable System, Flat Conductor. (Flat Conductor Cable System) A complete wiring system for branch circuits that is designed for installation under carpet squares. (324) (CMP-6)

Informational Note: The FCC system includes Type FCC cable and associated shielding, connectors, terminators, adapters, boxes, and receptacles.

Cable Termination. A connection consisting of an insulation system and a connector and installed on a medium voltage (Type MV) cable to connect from a cable to a device, such as equipment. (CMP-6)

N **Cable Tie.** A band or length of material employing a locking device, used for bundling, securing, and/or supporting cable, flexible conduit, or flexible tubing. (CMP-3)

Informational Note: The following are cable tie and cable tie fixing device type designations:

(1) Type(s) 1, 11, 2, 21, 2S, or 21S are evaluated for use in cable management applications.
(2) Type(s) 2S or 21S are also evaluated for securing and supporting cable, flexible conduit, and flexible tubing.

N **Cable Tie Fixing Device.** A component, such as a block or bracket, specifically designed to secure cable tie(s) to a mounting surface. (CMP-3)

Informational Note: The following are cable tie and cable tie fixing device type designations:

(1) Type(s) 1, 11, 2, 21, 2S, or 21S are evaluated for use in cable management applications.
(2) Type(s) 2S or 21S are also evaluated for securing and supporting cable, flexible conduit, and flexible tubing.

Cable Tray System. A unit or assembly of units or sections and associated fittings forming a structural system used to securely fasten or support cables and raceways. (CMP-8)

Cablebus. An assembly of units or sections with insulated conductors having associated fittings forming a structural system used to securely fasten or support conductors and conductor terminations in a completely enclosed, ventilated, protective metal housing. This assembly is designed to carry fault current and to withstand the magnetic forces of such current. (CMP-8)

Informational Note: Cablebus is ordinarily assembled at the point of installation from the components furnished or specified by the manufacturer in accordance with instructions for the specific job.

N **Cannabis Oil Booths.** Enclosed areas used to house cannabis oil equipment and systems. (CMP-14)

Informational Note: Cannabis oil booths can be designed to house a single piece or multiple pieces of cannabis oil equipment. Booths range in size and can be large enough to permit entrance of personnel to perform the processing tasks.

N **Cannabis Oil Extraction Equipment.** Equipment that uses flammable materials (solvents) in the process of extracting the plant oil from the plant material. (CMP-14)

Informational Note: Extraction equipment can use flammable materials as solvents to extract the plant oil from the plant material by saturating the plant material in a vented container, sealed container, or pressure vessel. Typical flammable materials used

in the extraction process include butane, ethanol, hexane, pentane, propane, and LPG.

N **Cannabis Oil Post-Processing Equipment.** Equipment that is used in the final processing stages of the extracted plant oil. (CMP-14)

Informational Note: Examples of cannabis oil post-processing equipment include vacuum ovens, rotary evaporators, and solvent recovery pumps.

N **Cannabis Oil Preparatory Equipment.** Equipment that is used to prepare the plant material for subsequent extraction of the plant oil. (CMP-14)

Informational Note: Examples of cannabis oil preparatory equipment include trimming, deseeding, and drying/curing equipment.

N **Cannabis Oil Systems.** Any combination of cannabis oil equipment needed for the overall extraction process. (CMP-14)

Informational Note: Examples of cannabis oil systems include any combination of cannabis oil preparatory equipment, cannabis oil extraction equipment, cannabis oil booths, and cannabis oil post-processing equipment.

Cell (as applied to batteries). The basic electrochemical unit, characterized by an anode and a cathode, used to receive, store, and deliver electrical energy. (CMP-13)

Cell, Sealed. (Sealed Cell) A cell that has no provision for the routine addition of water or electrolyte or for external measurement of electrolyte specific gravity and might contain pressure relief venting. (CMP-13)

Cell Line. An assembly of electrically interconnected electrolytic cells supplied by a source of dc power. (CMP-12)

Cell Line Attachments and Auxiliary Equipment. A term that includes, but is not limited to, auxiliary tanks; process piping; ductwork; structural supports; exposed cell line conductors; conduits and other raceways; pumps, positioning equipment, and cell cutout or bypass electrical devices. Auxiliary equipment includes tools, welding machines, crucibles, and other portable equipment used for operation and maintenance within the electrolytic cell line working zone. In the cell line working zone, auxiliary equipment includes the exposed conductive surfaces of ungrounded cranes and crane-mounted cell-servicing equipment. (668) (CMP-12)

Charge Controller. Equipment that controls dc voltage or dc current, or both, and that is used to charge a battery or other energy storage device. (CMP-13)

Charger Power Converter. The device used to convert energy from the power grid to a high-frequency output for wireless power transfer. (625) (CMP-12)

Child Care Facility. A building or structure, or portion thereof, for educational, supervisory, or personal care services for more than four children 7 years old or less. (406) (CMP-18)

Circuit Breaker. A device designed to open and close a circuit by nonautomatic means and to open the circuit automatically on a predetermined overcurrent without damage to itself when properly applied within its rating. (CMP-10)

Informational Note: The automatic opening means can be integral, direct acting with the circuit breaker, or remote from the circuit breaker.

Circuit Breaker, Adjustable. (Adjustable Circuit Breaker) A qualifying term indicating that the circuit breaker can be set to trip at various values of current, time, or both, within a predetermined range. (CMP-10)

Circuit Breaker, Instantaneous Trip. (Instantaneous Trip Circuit Breaker) A qualifying term indicating that no delay is purposely introduced in the tripping action of the circuit breaker. (CMP-10)

Circuit Breaker, Inverse Time. (Inverse Time Circuit Breaker) A qualifying term indicating that there is a delay purposely introduced in the tripping action of the circuit breaker, and the delay decreases as the magnitude of the current increases. (CMP-10)

Circuit Breaker, Nonadjustable. (Nonadjustable Circuit Breaker) A qualifying term indicating that the circuit breaker does not have any adjustment to alter the value of the current at which it will trip or the time required for its operation. (CMP-10)

Class 1 Circuit. The portion of the wiring system between the load side of the Class 1 power source and the connected equipment. (CMP-3)

Δ **Class 2 Circuit.** The portion of the wiring system between the load side of a Class 2 power source and the connected equipment. (CMP-3)

Informational Note: The design of a Class 2 circuit considers safety from a fire initiation standpoint and provides acceptable protection from electric shock due to its power limitations.

Δ **Class 3 Circuit.** The portion of the wiring system between the load side of a Class 3 power source and the connected equipment. (CMP-3)

Informational Note: The design of a Class 3 circuit considers safety from a fire initiation standpoint. Since higher levels of voltage and current than a Class 2 circuit are permitted, additional safeguards are specified to provide acceptable protection from electric shock.

Class 4 Circuit. The portion of the wiring system between the load side of a Class 4 transmitter and the Class 4 receiver or Class 4 utilization equipment, as appropriate. (CMP-3)

Informational Note No. 1: A Class 4 circuit is also commonly referred to as a fault-managed power circuit.

Informational Note No. 2: Due to the active monitoring and control of the voltage and current provided, a Class 4 circuit considers safety from a fire initiation standpoint and provides acceptable protection from electric shock.

Class 4 Device. Any active device connected to the Class 4 circuit; examples include a Class 4 transmitter, a Class 4 receiver, or Class 4 utilization equipment. (CMP-3)

Class 4 Power System. An actively monitored and controlled system consisting of one or more Class 4 transmitters and one or more Class 4 receivers connected by a cabling system. (CMP-3)

Class 4 Receiver. A device that accepts Class 4 power and converts it for use by utilization equipment. (CMP-3)

Class 4 Transmitter. A device that sources Class 4 power. (726) (CMP-3)

Informational Note: A Class 4 transmitter is different from traditional power sources in that it monitors the line for faults (both

line-to-line and line-to-ground) and ceases power transmission if a fault is sensed.

Class 4 Utilization Equipment. Devices that are directly powered by a Class 4 transmitter without the need for a separate Class 4 receiver (the receiver is integrated into the equipment). (CMP-3)

Closed Construction. Any building, building component, assembly, or system manufactured in such a manner that all concealed parts of processes of manufacture cannot be inspected after installation at the building site without disassembly, damage, or destruction. (545) (CMP-7)

Clothes Closet. A nonhabitable room or space intended primarily for storage of garments and apparel. (CMP-1)

Clothes Closet Storage Space. The area within a clothes closet in which combustible materials can be kept. (410) (CMP-18)

Collector Rings. An assembly of slip rings for transferring electric energy from a stationary to a rotating member. (675) (CMP-7)

Combiner (DC). (dc Combiner) (Direct-Current Combiner) An enclosure that includes devices used to connect two or more PV system dc circuits in parallel. (690) (CMP-4)

Combustible Dust. Solid particles that are 500 µm or smaller (i.e., material passing a US No. 35 Standard Sieve as defined in ASTM E11-17, *Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves*) that can form an explosible mixture when suspended in air at standard atmospheric pressure and temperature. [**499:**3.3.3] (CMP-14)

Informational Note: See ASTM E1226, *Standard Test Method for Explosibility of Dust Clouds*; ISO 6184-1, *Explosion protection systems — Part 1: Determination of explosion indices of combustible dusts in air*; or ANSI/UL 80079-20-2, *Explosive Atmospheres — Part 20-2: Material Characteristics — Combustible Dusts Test Methods*, for procedures for determining the explosibility of dusts. Historically, explosibility has been described as presenting a flash fire or explosion hazard. It could be understood that potential hazards due to the formation of an explosible mixture when suspended in air at standard atmospheric pressure and temperature would include ignition.

Combustible Gas Detection System. A protection technique utilizing stationary gas detectors in industrial establishments. (CMP-14)

Commissioning. The process, procedures, and testing used to set up and verify the initial performance, operational controls, safety systems, and sequence of operation of electrical devices and equipment, prior to it being placed into active service. (CMP-13)

N **Communications, Data. (Data Communications)** The transfer and reception of information in the form of a digital bitstream or a digitized analog signal transmitted over a point-to-point or point-to-multipoint arrangement. (CMP-16)

Communications Circuit. A metallic, fiber, or wireless circuit that provides voice/data (and associated power) for communications-related services between communications equipment. (CMP-16)

Informational Note: Because communications can be carried over conductors with power, meeting both this definition and the definition for another circuit defined by this code is possible. For example, a power line communications device can be used on a branch circuit. The addition of data to an existing circuit type defined by this code does not by itself change the requirements for the existing circuit type in this code.

Communications Circuit, Network-Powered Broadband. (Network-Powered Broadband Communications Circuit) The circuit extending from the communications utility's or service provider's serving terminal or tap up to and including the network interface unit (NIU). (830) (CMP-16)

Informational Note: A typical one-family dwelling network-powered communications circuit consists of a communications drop or communications service cable and an NIU and includes the communications utility's serving terminal or tap where it is not under the exclusive control of the communications utility.

Δ **Communications Circuit, Premises. (Premises Communications Circuit)** The circuit that extends voice, audio, video, data, interactive services, telegraph (except radio), and outside wiring for fire alarm and burglar alarm from the service provider's network terminal to the customer's communications equipment. (CMP-16)

Communications Equipment. The electronic equipment that performs the telecommunications operations for the transmission of audio, video, and data, and includes power equipment (e.g., dc converters, inverters, and batteries), technical support equipment (e.g., computers), and conductors dedicated solely to the operation of the equipment. (CMP-16)

Informational Note: As the telecommunications network transitions to a more data-centric network, computers, routers, servers, and their powering equipment, are becoming essential to the transmission of audio, video, and data and are finding increasing application in communications equipment installations.

Communications Service Provider. An organization, business, or individual that offers communications service to others. (CMP-16)

N **Communications System.** The communications equipment, communication circuits, and manual and machine operations necessary for the transmission, movement, and reception of information (e.g., voice, audio, data). (CMP-16)

N **Communications Utility.** An organization designated or recognized by an entity such as a public service commission or public utility commission, or recognized as such under federal, state, or local law. (CMP-16)

Community Antenna Television Circuit (CATV). The circuit that extends community antenna television systems for audio, video, data, and interactive services from the service provider's network terminal to the appropriate customer equipment. (CMP-16)

Concealable Nonmetallic Extension. A listed assembly of two, three, or four insulated circuit conductors within a nonmetallic jacket, an extruded thermoplastic covering, or a sealed nonmetallic covering. The classification includes surface extensions intended for mounting directly on the surface of walls or ceilings and concealed with paint, texture, joint compound, plaster, wallpaper, tile, wall paneling, or other similar materials. (CMP-6)

Concealed. Rendered inaccessible by the structure or finish of the building. (CMP-1)

Informational Note: Wires in concealed raceways are considered concealed, even though they may become accessible by withdrawing them.

Concealed Knob-and-Tube Wiring. A wiring method using knobs, tubes, and flexible nonmetallic tubing for the protection and support of single insulated conductors. (CMP-6)

N **Conductive Pavement Heating System.** A system in which heat is generated by passing current through the pavement material and between electrodes embedded within the pavement material. (426) (CMP-17)

Conductor, Bare. (Bare Conductor) A conductor having no covering or electrical insulation whatsoever. (CMP-6)

Conductor, Copper-Clad Aluminum. (Copper-Clad Aluminum Conductor) Conductor drawn from a copper-clad aluminum rod, with the copper metallurgically bonded to an aluminum core. (CMP-6)

Conductor, Covered. (Covered Conductor) A conductor encased within material of composition or thickness that is not recognized by this code as electrical insulation. (CMP-6)

Conductor, Insulated. (Insulated Conductor) A conductor encased within material of composition and thickness that is recognized by this code as electrical insulation. (CMP-6)

Δ Conductor, Insulated. (Insulated Conductor) Overhead service conductor encased in a polymeric material adequate for the applied nominal voltage and any conductor types described in 310.4. (396) (CMP-6)

Informational Note: See ICEA S-76-474-2011, *Standard for Neutral Supported Power Cable Assemblies with Weather-Resistant Extruded Insulation Rated 600 Volts*, for information about overhead service conductors.

Conductors, Outdoor Overhead. (Outdoor Overhead Conductors) Single conductors, insulated, covered, or bare, installed outdoors on support structures in free air. (395) (CMP-6)

Conduit, Flexible Metal (FMC). (Flexible Metal Conduit) A raceway of circular cross section made of helically wound, formed, interlocked metal strip. (CMP-8)

Conduit, High Density Polyethylene (HDPE). (High Density Polyethylene Conduit) A nonmetallic raceway of circular cross section, with associated couplings, connectors, and fittings for the installation of electrical conductors. (CMP-8)

Conduit, Intermediate Metal (IMC). (Intermediate Metal Conduit) A steel threadable raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment grounding conductor when installed with its integral or associated coupling and appropriate fittings. (CMP-8)

Conduit, Liquidtight Flexible Metal (LFMC). (Liquidtight Flexible Metal Conduit) A raceway of circular cross section having an outer liquidtight, nonmetallic, sunlight-resistant jacket over an inner flexible metal core with associated couplings, connectors, and fittings for the installation of electric conductors. (CMP-8)

Δ Conduit, Liquidtight Flexible Nonmetallic (LFNC). (Liquidtight Flexible Nonmetallic Conduit) A raceway of circular cross section of various types as follows:

(1) A smooth seamless inner core and cover bonded together and having one or more reinforcement layers between the core and covers, designated as LFNC-A
(2) A smooth inner surface with integral reinforcement within the raceway wall, designated as LFNC-B
(3) A corrugated internal and external surface without integral reinforcement within the raceway wall, designated as LFNC-C

(CMP-8)

Informational Note: FNMC is an alternative designation for LFNC.

Conduit, Nonmetallic Underground with Conductors (NUCC). (Nonmetallic Underground Conduit with Conductors) A factory assembly of conductors or cables inside a nonmetallic, smooth wall raceway with a circular cross section. (CMP-8)

Conduit, Reinforced Thermosetting Resin (RTRC). (Reinforced Thermosetting Resin Conduit) A rigid nonmetallic raceway of circular cross section, with integral or associated couplings, connectors, and fittings for the installation of electrical conductors and cables. (CMP-8)

Conduit, Rigid Metal (RMC). (Rigid Metal Conduit) A threadable raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment grounding conductor when installed with its integral or associated coupling and appropriate fittings. (CMP-8)

Conduit, Rigid Polyvinyl Chloride (PVC). (Rigid Polyvinyl Chloride Conduit) A rigid nonmetallic raceway of circular cross section, with integral or associated couplings, connectors, and fittings for the installation of electrical conductors and cables. (CMP-8)

Conduit Body. A separate portion of a conduit or tubing system that provides access through a removable cover(s) to the interior of the system at a junction of two or more sections of the system or at a terminal point of the system.

Boxes such as FS and FD or larger cast or sheet metal boxes are not classified as conduit bodies. (CMP-8)

Connector. An electromechanical fitting. (393) (CMP-18)

Connector, Intercell. (Intercell Connector) An electrically conductive bar or cable used to connect adjacent cells. (CMP-13)

Connector, Intertier. (Intertier Connector) An electrical conductor used to connect two cells on different tiers of the same rack or different shelves of the same rack. (CMP-13)

Connector, Load. (Load Connector) An electromechanical connector used for power from the busbar to utilization equipment. (393) (CMP-18)

Connector, Pendant. (Pendant Connector) An electromechanical or mechanical connector used to suspend low-voltage luminaire or utilization equipment below the grid rail and to supply power to connect from the busbar to utilization equipment. (393) (CMP-18)

Connector, Power Feed. (Power Feed Connector) An electromechanical connector used to connect the power supply to a power distribution cable, to connect directly to the busbar, or to connect from a power distribution cable to the busbar. (393) (CMP-18)

Connector, Pressure (Solderless). (Pressure Connector) A device that establishes a connection between two or more conductors or between one or more conductors and a terminal

by means of mechanical pressure and without the use of solder. (CMP-1)

Connector, Rail to Rail. (Rail to Rail Connector) An electromechanical connector used to interconnect busbars from one ceiling grid rail to another grid rail. (393) (CMP-18)

Connector Strip. A metal wireway containing pendant or flush receptacles. (520) (CMP-15)

Container (as applied to batteries). A single-cell or multicell vessel or jar that holds the plates, electrolyte, and other elements of a single unit in a battery. (CMP-13)

Continuous Load. A load where the maximum current is expected to continue for 3 hours or more. (CMP-2)

Control. The predetermined process of connecting, disconnecting, increasing, or reducing electric power. (130) (CMP-13)

Control Circuit. The circuit of a control apparatus or system that carries the electric signals directing the performance of the controller but does not carry the main power current. (CMP-11)

Control Circuits, Fault-Tolerant External. (Fault-Tolerant External Control Circuits) Those control circuits either entering or leaving the fire pump controller enclosure, which if broken, disconnected, or shorted will not prevent the controller from starting the fire pump from all other internal or external means and may cause the controller to start the pump under these conditions. (695) (CMP-13)

Control Device, Emergency Lighting (ELCD). (Emergency Lighting Control Device) A separate or integral device intended to perform one or more emergency lighting control functions. (700) (CMP-13)

Informational Note: See UL 924, *Emergency Lighting and Power Equipment*, for information covering emergency lighting control devices.

Control Drawing. A drawing or other document provided by the manufacturer of the intrinsically safe or associated apparatus, or of the nonincendive field wiring apparatus or associated nonincendive field wiring apparatus, that details the allowed interconnections between the intrinsically safe and associated apparatus or between the nonincendive field wiring apparatus or associated nonincendive field wiring apparatus. (CMP-14)

Informational Note: See the following standards for additional information:

(1) ANSI/ISA/UL 120202, *Recommendations for the Preparation, Content, and Organization of Intrinsic Safety Control Drawings*
(2) ANSI/UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*
(3) ANSI/UL 60079-11, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety "i"*
(4) ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*
(5) ANSI/ISA RP 12.06.01, *Recommended Practice for Wiring Methods for Hazardous (Classified) Locations Instrumentation — Part 1: Intrinsic Safety*

Control Room. An enclosed control space outside the hoistway, intended for full bodily entry, that contains the elevator motor controller. The room could also contain electrical and/or mechanical equipment used directly in connection with the elevator or dumbwaiter but not the electric driving machine or the hydraulic machine. (620) (CMP-12)

Control Space. A space inside or outside the hoistway intended to be accessed with or without full bodily entry that contains the elevator motor controller. This space could also contain electrical and/or mechanical equipment used directly in connection with the elevator, dumbwaiter, escalator, moving walk, or platform lift, but not the electrical driving machine or the hydraulic machine. (620) (CMP-12)

Control System. The overall system governing the starting, stopping, direction of motion, acceleration, speed, and retardation of the moving member. (620) (CMP-12)

Controller. A device or group of devices that serves to govern, in some predetermined manner, the electric power delivered to the apparatus to which it is connected. (CMP-1)

Controller, Motion. (Motion Controller) The electrical device(s) for that part of the control system that governs the acceleration, speed, retardation, and stopping of the moving member. (620) (CMP-12)

Informational Note: The motor control function may be integral to the motion controller.

Controller, Motor. (Motor Controller) Any switch or device that is normally used to start and stop a motor by making and breaking the motor circuit current. (CMP-11)

Controller, Operation. (Operation Controller) The electrical device(s) for that part of the control system that initiates the starting, stopping, and direction of motion in response to a signal from an operating device. (620) (CMP-12)

Converter, dc-to-dc. (dc-to-dc Converter) A device that can provide an output dc voltage and current at a higher or lower value than the input dc voltage and current. (CMP-4)

Converter Circuit, dc-to-dc. (dc-to-dc Converter Circuit) The dc circuit conductors connected to the output of a dc-to-dc converter. (CMP-4)

Converting Device. That part of the heating equipment that converts input mechanical or electrical energy to the voltage, current, and frequency used for the heating applicator. A converting device consists of equipment using line frequency, all static multipliers, oscillator-type units using vacuum tubes, inverters using solid-state devices, or motor-generator equipment. (665) (CMP-12)

Cooking Unit, Counter-Mounted. (Counter-Mounted Cooking Unit) A cooking appliance designed for mounting in or on a counter and consisting of one or more heating elements, internal wiring, and built-in or mountable controls. (CMP-2)

Coordination, Selective. (Selective Coordination) Localization of an overcurrent condition to restrict outages to the circuit or equipment affected, accomplished by the selection and installation of overcurrent protective devices (OCPDs) and their ratings or settings for the full range of available overcurrents, from overload to the available fault current, and for the full range of overcurrent protective device (OCPD) opening times associated with those overcurrents. (CMP-10)

Cord, Flexible. (Flexible Cord) Two or more flexible insulated conductors enclosed in a flexible covering. (CMP-6)

Cord Connector. A contact device terminated to a flexible cord that accepts an attachment plug or other insertion device. (CMP-6)

Cord Connector [as applied to hazardous (classified) locations]. A fitting intended to terminate a cord to a box or similar device and reduce the strain at points of termination and might include an explosionproof, a dust-ignitionproof, or a flameproof seal. (CMP-14)

Cord Set. A length of flexible cord having an attachment plug at one end and a cord connector at the other end. (CMP-6)

Corrosive Environment. Areas or enclosures without adequate ventilation, where electrical equipment is located and pool sanitation chemicals are stored, handled, or dispensed . (680) (CMP-17).

Informational Note No. 1: See *Advisory: Swimming Pool Chemical: Chlorine*, OSWER 90-008.1, June 1990, available from the EPA National Service Center for Environmental Publications (NSCEP) as sanitation chemicals and pool water are considered to pose a risk of corrosion (gradual damage or destruction of materials) due to the presence of oxidizers (e.g., calcium hypochlorite, sodium hypochlorite, bromine, chlorinated isocyanurates) and chlorinating agents that release chlorine when dissolved in water.

Informational Note No. 2: See ANSI/APSP-11, *Standard for Water Quality in Public Pools and Spas*, ANSI/ASHRAE 62.1, Table 6-4 Minimum Exhaust Rates, and *2021 International Swimming Pool and Spa Code (ISPSC)*, Section 324, including associated definitions and requirements concerning adequate ventilation of indoor spaces such as equipment and chemical storage rooms, which can reduce the likelihood of the accumulation of corrosive vapors. Chemicals such as chlorine cause severe corrosive and deteriorating effects on electrical connections, equipment, and enclosures when stored and kept in the same vicinity.

Counter (Countertop). A fixed or stationary surface typically intended for food or beverage preparation, food or beverage serving, personal lavation, or laundering or a similar surface that presents a routine risk of spillage of larger quantities of liquids upon outlets mounted directly on or in the surface. (CMP-2)

Informational Note No. 1: See UL 498, *Receptacles and Attachment Plugs*, and UL 943, *Ground-Fault Circuit Interrupters*, which establish the performance evaluation criteria and construction criteria.

Informational Note No. 2: See 406.14(E), 406.14(G)(1), and 406.14(H) for information on receptacles for counters and countertops distinguished from receptacles for work surfaces.

Crane. A mechanical device used for lifting or moving boats. [**303:**3.3.6] (555) (CMP-7)

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 the normal power source. [**99:**3.3.30] (517) (CMP-15)

Critical Operations Areas, Designated (DCOA). (Designated Critical Operations Areas) Areas within a facility or site designated as requiring critical operations power. (CMP-13)

Critical Operations Data System. An information technology equipment system that requires continuous operation for reasons of public safety, emergency management, national security, or business continuity. (645) (CMP-12)

Critical Operations Power Systems (COPS). Power systems for facilities or parts of facilities that require continuous operation for the reasons of public safety, emergency management, national security, or business continuity. (CMP-13)

Δ **Current-Limiting [as applied to overcurrent protective devices (OCPDs)].** The ability to, when interrupting currents in its current-limiting range, reduce the current flowing in the faulted circuit to a magnitude substantially less than that obtainable in the same circuit if the device were replaced with a solid conductor having comparable impedance. (CMP-10)

Cutout Box. An enclosure designed for surface mounting that has swinging doors or covers secured directly to and telescoping with the walls of the enclosure. (CMP-8)

Data Center, Modular (MDC). (Modular Data Center) Prefabricated units, rated 1000 volts or less, consisting of an outer enclosure housing multiple racks or cabinets of information technology equipment (ITE) (e.g., servers) and various support equipment, such as electrical service and distribution equipment, HVAC systems, and the like. (646) (CMP-12)

Informational Note: A typical construction may use a standard ISO shipping container or other structure as the outer enclosure, racks or cabinets of ITE, service-entrance equipment and power distribution components, power storage such as a UPS, and an air or liquid cooling system. Modular data centers are intended for fixed installation, either indoors or outdoors, based on their construction and resistance to environmental conditions. MDCs can be configured as an all-in-one system housed in a single equipment enclosure or as a system with the support equipment housed in separate equipment enclosures.

Direct-Current (dc) Plugging Box. A dc device consisting of one or more 2-pole, 2-wire, nonpolarized, non-grounding-type receptacles intended to be used on dc circuits only. (530) (CMP-15)

Dead-Front. Without live parts exposed to a person on the operating side of the equipment. (CMP-9)

Demand Factor. The ratio of the maximum demand of a system, or part of a system, to the total connected load of a system or the part of the system under consideration. (CMP-2)

Δ **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:**3.3.39] (CMP-15)

N **Deploy (Deployed).** The use of portable equipment for the duration required by the event or production for which it is used. (CMP-15)

Device. A unit of an electrical system, other than a conductor, that carries or controls electric energy as its principal function. (CMP-1)

Dielectric Heating. Heating of a nominally insulating material due to its own dielectric losses when the material is placed in a varying electric field. (665) (CMP-12)

Disconnecting Means. A device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply. (CMP-1)

Distribution Point (Center Yard Pole) (Meter Pole). An electrical supply point from which service drops, service conductors, feeders, or branch circuits to buildings or structures utilized under single management are supplied. (547) (CMP-7)

Informational Note: The service point is typically located at the distribution point.

Diversion Controller (Diversion Charge Controller) (Diversion Load Controller). Equipment that regulates the output of a source or charging process by diverting power to dc or ac loads or to an interconnected utility service. (CMP-13)

Diversion Load. A load connected to a diversion charge controller or diversion load controller, also known as a dump load. (CMP-4)

Docking Facility. A covered or open, fixed or floating structure that provides access to the water and to which boats are secured. [**303:**3.3.7] (555) (CMP-7)

Δ **Dormitory.** A building or a space in a building in which group sleeping accommodations are provided for more than 16 persons who are not members of the same family in one room, or a series of closely associated rooms, under joint occupancy and single management, with or without meals, but without individual cooking facilities. (CMP 2) [**101:**3.3.68]

Informational Note: Rooms within dormitories intended for the use of individuals for combined living and sleeping purposes are guest rooms or guest suites. Examples of dormitories are college dormitories, fraternity and sorority houses, and military barracks. [**101:**A.3.3.68] (CMP 2)

Drop Box. A box containing pendant- or flush-mounted receptacles attached to a multiconductor cable via strain relief or a multipole connector. (520) (CMP-15)

Δ **Dust-Ignitionproof.** Equipment enclosed in a manner that excludes dusts and does not permit arcs, sparks, or heat otherwise generated or liberated inside of the enclosure to cause ignition of exterior accumulations or atmospheric suspensions of a specified dust on or in the vicinity of the enclosure. (CMP-14)

Informational Note No. 1: See ANSI/UL 1203, *Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations*, for information on dust-ignitionproof enclosures.

Informational Note No. 2: See NEMA 250, *Enclosures for Electrical Equipment (1000 Volts Maximum)*, for information on dust-ignitionproof enclosures that are sometimes additionally marked Type 9.

Dusttight. Enclosures constructed so that dust will not enter under specified test conditions. (CMP-14)

Informational Note No. 1: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

Informational Note No. 2: See NEMA 250, *Enclosures for Electrical Equipment (1000 Volts Maximum),* and ANSI/UL 50E, *Enclosures for Electrical Equipment, Environmental Considerations*, for additional information on enclosure Types 3, 3X, 3S, 3SX, 4, 4X, 5, 6, 6P, 12, 12K, and 13 that are considered dusttight.

Duty, Continuous. (Continuous Duty) Operation at a substantially constant load for an indefinitely long time. (CMP-1)

Duty, Intermittent. (Intermittent Duty) Operation for alternate intervals of (1) load and no load; or (2) load and rest; or (3) load, no load, and rest. (CMP-1)

Duty, Periodic. (Periodic Duty) Intermittent operation in which the load conditions are regularly recurrent. (CMP-1)

Duty, Short-Time. (Short-Time Duty) Operation at a substantially constant load for a short and definite, specified time. (CMP-1)

Duty, Varying. (Varying Duty) Operation at loads, and for intervals of time, both of which may be subject to wide variation. (CMP-1)

Dwelling, One-Family. (One-Family Dwelling) A building that consists solely of one dwelling unit. (CMP-1)

Dwelling, Two-Family. (Two-Family Dwelling) A building that consists solely of two dwelling units. (CMP-1)

Dwelling, Multifamily. (Multifamily Dwelling) A building that contains three or more dwelling units. (CMP-1)

Dwelling Unit. A single unit, providing complete and independent living facilities for one or more persons, including permanent provisions for living, sleeping, cooking, and sanitation. (CMP-2)

Electric-Discharge Lighting. Systems of illumination utilizing fluorescent lamps, high-intensity discharge (HID) lamps, or neon tubing. (CMP-18)

Electric Power Production and Distribution Network. Power production, distribution, and utilization equipment and facilities, such as electric utility systems that are connected to premises wiring and are external to and not controlled by a system that operates in interactive mode. (CMP-4)

N **Electric Self-Propelled Vehicle (ESV).** A vehicle or marine vessel, other than an EV, such as farm equipment, boats, aircraft, and golf carts, primarily powered by an electric motor that draws current from a rechargeable storage battery, fuel cell, photovoltaic array, or other source of electric current. (624) (CMP-12)

N **Electric Self-Propelled Vehicle Power Export Equipment (ESVPE).** The equipment, including the outlet on the electric self-propelled vehicle (ESV), that is used to provide electrical power at voltages greater than or equal to 30 Vac or 60 Vdc to loads external to the ESV, using the vehicle as the source of supply. (624) (CMP-12)

Informational Note: Electric self-propelled vehicle power export equipment and electric self-propelled vehicle supply equipment or wireless power transfer equipment are sometimes contained in one piece of equipment, sometimes referred to as a bidirectional electric self-propelled vehicle supply equipment (ESVSE) or bidirectional wireless power transfer equipment (WPTE).

N **Electric Self-Propelled Vehicle Supply Equipment (ESVSE).** Equipment for plug-in charging, including the ungrounded, grounded, and equipment grounding conductors, and the electric self-propelled vehicle connectors, attachment plugs, personnel protection system, and all other fittings, devices,

power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the electric self-propelled vehicle. (624) (CMP-12)

Informational Note: Electric self-propelled vehicle power export equipment and electric self-propelled vehicle supply equipment or wireless power transfer equipment (WPTE) are sometimes contained in one piece of equipment, sometimes referred to as a bidirectional ESVSE or bidirectional WPTE.

Electric Supply Stations. Locations containing the generating stations and substations, including their associated generator, storage battery, transformer, and switchgear areas. (CMP-4)

Electric Vehicle (EV). An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, and electric motorcycles, primarily powered by an electric motor that draws current from a rechargeable storage battery, fuel cell, photovoltaic array, or other source of electric current. Plug-in hybrid electric vehicles (PHEV) are electric vehicles having a second source of motive power. (CMP-12)

Informational Note: Off-road, self-propelled electric mobile machines, such as industrial trucks, hoists, lifts, transports, golf carts, airline ground support equipment, tractors, and boats are not considered electric vehicles.

Δ **Electric Vehicle Connector.** A device that, when electrically coupled (conductive or inductive) to an electric vehicle inlet, establishes an electrical connection to the electric vehicle for the purpose of power transfer and information exchange. (625) (CMP-12)

Informational Note: See 625.48 for further information on interactive systems.

Electric Vehicle Power Export Equipment (EVPE). The equipment, including the outlet on the electric vehicle, that is used to provide electrical power at voltages greater than or equal to 30 Vac or 60 Vdc to loads external to the electric vehicle, using the electric vehicle as the source of supply. (625) (CMP-12)

Informational Note: Electric vehicle power export equipment and electric vehicle supply equipment or wireless power transfer equipment are sometimes contained in one piece of equipment, sometimes referred to as a bidirectional electric vehicle supply equipment (EVSE) or bidirectional wireless power transfer equipment (WPTE).

Electric Vehicle Supply Equipment (EVSE). Equipment for plug-in charging, including the ungrounded, grounded, and equipment grounding conductors, and the electric vehicle connectors, attachment plugs, personnel protection system, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the electric vehicle. (625) (CMP-12)

Informational Note: Electric vehicle power export equipment and electric vehicle supply equipment or wireless power transfer equipment (WPTE) are sometimes contained in one piece of equipment, sometimes referred to as a bidirectional EVSE or bidirectional WPTE.

Electrical Circuit Protective System. A system consisting of components and materials intended for installation as protection for specific electrical wiring systems with respect to the disruption of electrical circuit integrity upon exterior fire exposure. (CMP-16)

Electrical Datum Plane. A specified vertical distance above the normal high-water level at which electrical equipment can be installed and electrical connections can be made. (CMP-7)

Electrical Ducts. Electrical conduits, or other raceways round in cross section, that are suitable for use underground or embedded in concrete. (CMP-6)

Electrical Life Support Equipment. Electrically powered equipment whose continuous operation is necessary to maintain a patient's life. [**99**:3.3.47] (517) (CMP-15)

Electrical Resistance Trace Heating "60079-30-1". Type of protection for the purpose of producing heat on the principle of electrical resistance and typically composed of one or more metallic conductors and/or an electrically conductive material, suitably electrically insulated and protected. (CMP-14)

Informational Note: See ANSI/UL 60079-30-1, *Explosive Atmospheres — Part 30-1: Electrical Resistance Trace Heating — General and Testing Requirements*, for additional information.

Electrically Connected. A connection capable of carrying current as distinguished from connection through electromagnetic induction. (668) (CMP-12)

Electrified Truck Parking Space. A truck parking space that has been provided with an electrical system that allows truck operators to connect their vehicles while stopped and to use off-board power sources in order to operate on-board systems such as air conditioning, heating, and appliances, without any engine idling. (626) (CMP-12)

Informational Note: An electrified truck parking space also includes dedicated parking areas for heavy-duty trucks at travel plazas, warehouses, shipper and consignee yards, depot facilities, and border crossings. It does not include areas such as the shoulders of highway ramps and access roads, camping and recreational vehicle sites, residential and commercial parking areas used for automotive parking or other areas where ac power is provided solely for the purpose of connecting automotive and other light electrical loads, such as engine block heaters, and at private residences.

Electrified Truck Parking Space Wiring Systems. All of the electrical wiring, equipment, and appurtenances related to electrical installations within an electrified truck parking space, including the electrified parking space supply equipment. (626) (CMP-12)

Electrolyte. The medium that provides the ion transport mechanism between the positive and negative electrodes of a cell. (CMP-13)

Electrolytic Cell. A tank or vat in which electrochemical reactions are caused by applying electric energy for the purpose of refining or producing usable materials. (668) (CMP-12)

Electrolytic Cell Line Working Zone. The space envelope wherein operation or maintenance is normally performed on or in the vicinity of exposed energized surfaces of electrolytic cell lines or their attachments. (668) (CMP-12)

Electronic Power Converter. A device that uses power electronics to convert one form of electrical power into another form of electrical power. (CMP-4)

Informational Note: Examples of electronic power converters include, but are not limited to, inverters, dc-to-dc converters, and electronic charge controllers. These devices have limited current capabilities based on the device ratings at continuous rated power.

Electronically Protected. A motor provided with electronic control that is an integral part of the motor and protects the motor against dangerous overheating due to failure of the electronic control, overload, and failure to start. (430) (CMP-11)

Emergency Luminaire, Battery-Equipped. (Battery-Equipped Emergency Luminaire) A luminaire with a rechargeable battery, a battery charging means, and an automatic load control relay. (CMP-13)

Emergency Luminaire, Directly Controlled (DCEL). (Directly Controlled Emergency Luminaire) A luminaire supplied by the facility emergency power system and with a control input for dimming or switching that provides an emergency illumination level upon loss of normal power. (700) (CMP-13)

Informational Note: See ANSI/UL 924, *Emergency Lighting and Power Equipment*, for information covering directly controlled emergency luminaires.

Emergency Power Supply (EPS). The source(s) of electric power of the required capacity and quality for an emergency power supply system (EPSS). (CMP-13)

Emergency Power Supply System (EPSS). A complete functioning EPS system coupled to a system of conductors, disconnecting means and overcurrent protective devices (OCPDs), transfer switches, and all control, supervisory, and support devices up to and including the load terminals of the transfer equipment needed for the system to operate as a safe and reliable source of electric power. [**110:**3.3.4] (CMP-13)

Emergency Systems. Those systems legally required and classed as emergency by municipal, state, federal, or other codes, or by any governmental agency having jurisdiction. These systems are intended to automatically supply illumination, power, or both, to designated areas and equipment in the event of failure of the normal supply or in the event of accident to elements of a system intended to supply, distribute, and control power and illumination essential for safety to human life. (CMP-13)

Encapsulation "m". Type of protection where electrical parts that could ignite an explosive atmosphere by either sparking or heating are enclosed in a compound in such a way that this explosive atmosphere cannot be ignited. (CMP-14)

Informational Note: See ANSI/UL 60079-18, *Explosive atmospheres — Part 18: Equipment protection by encapsulation "m"*, for additional information.

Enclosed. Surrounded by a case, housing, fence, or wall(s) that prevents persons from accidentally contacting energized parts. (CMP-1)

Enclosed-Break. Having electrical make-or-break contacts such that, if an internal explosion of the flammable gas or vapor that can enter it occurs, the device will withstand the internal explosion without suffering damage and without communicating the internal explosion to the external flammable gas or vapor. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

Δ **Enclosure.** The case or housing of apparatus or the fence or walls surrounding an installation,intended to prevent personnel from either unintentionally contacting energized parts or to protect the equipment from physical damage, or both. (CMP-1)

Informational Note: See Table 110.28 for examples of enclosure types.

Energized. Electrically connected to, or is, a source of voltage. (CMP-1)

Energized, Likely to Become. (Likely to Become Energized) Conductive material that could become energized because of the failure of electrical insulation or electrical spacing. (CMP-5)

Δ **Energy Management System (EMS).** A system that monitors and controls power within an electrical system. (CMP-13)

Δ **Energy Storage System (ESS).** One or more devices, assembled together, capable of storing energy to supply electrical energy at a future time. [**855:**3.3.9] (CMP-13)

Informational Note No. 1: An ESS(s) can include but is not limited to batteries, capacitors, and kinetic energy devices (e.g., flywheels and compressed air).

Informational Note No. 2: A battery ESS differs from a stationary battery installation in that they are evaluated and listed as a complete system that can include inverters or converters to change voltage levels or to make a change between an ac or a dc system.

Entertainment Device. A mechanical or electromechanical device that provides an entertainment experience. (522) (CMP-15)

Informational Note: These devices can include animated props, show action equipment, animated figures, and special effects, coordinated with audio and lighting to provide an entertainment experience.

Equipment. A general term, including fittings, devices, appliances, luminaires, apparatus, machinery, and the like used as a part of, or in connection with, an electrical installation. (CMP-1)

N **Equipment, Interconnection. (Interconnection Equipment)** Equipment that performs protective and control functions that enables power sources, or systems supplied by power sources, to operate in parallel with, separate from, and reconnect to systems supplied by other power sources. (CMP-4)

Equipment, Mobile. (Mobile Equipment) Equipment with electrical components that is suitable to be moved only with mechanical aids or is provided with wheels for movement by a person(s) or powered devices. (513) (CMP-14)

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N **Equipment, Mobile (as applied to equipment over 1000 volts ac or 1500 volts dc). (Mobile Equipment)** Equipment of which at least a portion is intended to move or be moved from place to place during operation. (CMP-9)

N **Equipment, Portable (as applied to equipment over 1000 volts ac or 1500 volts dc). (Portable Equipment)** Equipment intended to be disconnected, moved to a different location, and reconnected in that location. (CMP-9)

Δ **Equipment, Portable [as applied to hazardous (classified) locations]. (Portable Equipment)** Equipment with electrical components intended to be carried or moved by a single person without mechanical aids. (CMP-14)

Equipment, Portable. (Portable Equipment) Equipment fed with portable cords or cables intended to be moved from one place to another. (520) (CMP-15)

Equipment, Portable. (Portable Equipment) Equipment intended to be moved from one place to another. (530) (CMP-15)

Equipment, Signal. (Signal Equipment) Includes audible and visual equipment such as chimes, gongs, lights, and displays that convey information to the user. (620) (CMP-12)

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**:3.3.52] (517) (CMP-15)

Equipment Protection Level (EPL). Level of protection assigned to equipment based on its likelihood of becoming a source of ignition, and distinguishing the differences between explosive gas atmospheres and explosive dust atmospheres. (CMP-14)

Informational Note: See ANSI/UL 60079-0, *Explosive Atmospheres — Part 0: Equipment — General Requirements*, for additional information.

Equipment Rack. A framework for the support, enclosure, or both, of equipment; can be portable or stationary. (640) (CMP-12)

Informational Note: See EIA/ECA 310-E-2005, *Cabinets, Racks, Panels and Associated Equipment*, for examples of equipment racks.

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Equipotential Plane. Conductive elements that are connected together to minimize voltage differences. (CMP-7)

Essential Electrical System. A distribution system designed to ensure continuity of electrical power to designated areas and functions of a health care facility upon loss of one of the on-site or off-site sources with reliability and capacity sufficient to provide effective facility operation consistent with the facility's emergency operations plan. [**99:**3.3.54] (517) (CMP-15)

Explosionproof Equipment. Equipment enclosed in a case that is capable of withstanding an explosion of a specified gas or vapor that might occur within it, that is capable of preventing the ignition of a specified gas or vapor surrounding the enclosure by sparks, flashes, or explosion of the gas or vapor within, and that operates at such an external temperature that a surrounding flammable atmosphere will not be ignited. (CMP-14)

Informational Note No. 1: See ANSI/UL 1203, *Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations*, for additional information.

Informational Note No. 2: See NEMA 250, *Enclosures for Electrical Equipment (1000 Volts Maximum)*, for additional information on explosionproof enclosures that are sometimes additionally marked Type 7.

Exposed (as applied to live parts). Capable of being inadvertently touched or approached nearer than a safe distance by a person. (CMP-1)

Informational Note: This term applies to parts that are not suitably guarded, isolated, or insulated.

Exposed (as applied to wiring methods). On or attached to the surface or behind panels designed to allow access. (CMP-1)

Exposed (Optical Fiber Cable Exposed to Accidental Contact). A conductive optical fiber cable in such a position that, in case of failure of supports or insulation, contact between the cable's non–current-carrying conductive members and an electrical circuit might result. (CMP-16)

Exposed (to Accidental Contact). A circuit in such a position that, in case of failure of supports or insulation, contact with another circuit may result. (CMP-16)

Exposed Conductive Surfaces. Those surfaces that are capable of carrying electric current and that are unprotected, uninsulated, unenclosed, or unguarded, permitting personal contact. [**99:**3.3.57] (517) (CMP-15)

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

Externally Operable. Capable of being operated without exposing the operator to contact with live parts. (CMP-1)

Facility, On-Site Power Production. (On-Site Power Production Facility) The normal supply of electric power for the site that is expected to be constantly producing power. (695) (CMP-13)

Fault-Managed Power (FMP). A powering system that monitors for faults and controls current delivered to ensure fault energy is limited. (726) (CMP-3)

Informational Note No. 1: The monitoring and control systems differentiate fault-managed power from electric light and power circuits; therefore, alternative requirements to those of Chapters 1 through 4 are given regarding minimum wire sizes, ampacity adjustment and correction factors, overcurrent protection, insulation requirements, and wiring methods and materials.

Informational Note No. 2: A fault-managed power circuit is also commonly referred to as a Class 4 circuit.

Fault Current. The current delivered at a point on the system during a short-circuit condition. (CMP-10)

Δ **Fault Current, Available. (Available Fault Current)** The largest amount of current capable of being delivered at a point on the system during a short-circuit condition. (CMP-10)

Informational Note: A short-circuit can occur during abnormal conditions such as a fault between circuit conductors or a ground fault. See Figure Informational Note 100.1.

Fault Protection Device. An electronic device that is intended for the protection of personnel and functions under fault conditions, such as network-powered broadband communications cable short or open circuit, to limit the current or voltage, or both, for a low-power network-powered broadband communications circuit and provide acceptable protection from electric shock. (830) (CMP-16)

Feeder. All circuit conductors between the service equipment, the source of a separately derived system, or other power supply source and the final branch-circuit overcurrent protective device (OCPD). (CMP-10)

Feeder Assembly. The overhead or under-chassis feeder conductors, including the equipment grounding conductor, together with the necessary fittings and equipment; or the power-supply cord assembly for a mobile home, recreational vehicle, or park trailer, identified for the delivery of energy from the source of electrical supply to the panelboard within the mobile home, recreational vehicle, or park trailer. (CMP-7)

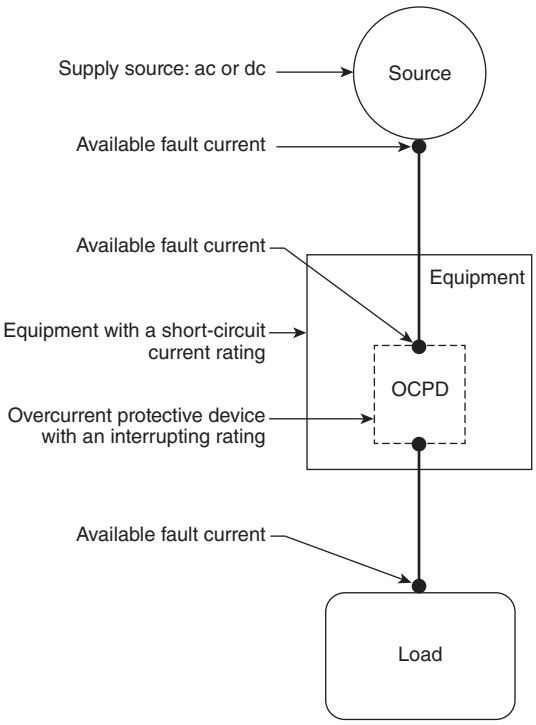

FIGURE Informational Note 100.1 Available Fault Current.

Festoon Lighting. A string of outdoor lights that is suspended between two points. (CMP-18)

Δ **Fibers/Flyings, Combustible. (Combustible Fibers/Flyings)** Fibers/flyings, where any dimension is greater than 500 µm in nominal size, which can form an explosible mixture when suspended in air at standard atmospheric pressure and temperature. [**499:**3.3.4.1] (CMP-14)

Informational Note No. 1: This definition and Informational Notes No. 2 and No. 3 have been extracted from NFPA 499, *Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*. The NFPA 499 reference is in brackets. Only editorial changes were made to the extracted text to make it consistent with this code.

Informational Note No. 2: Section 500.5(D) defines a Class III location. Combustible fibers/flyings can be similar in physical form to ignitible fibers/flyings and protected using the same electrical equipment installation methods. Examples of fibers/flyings include flat platelet-shaped particulate, such as metal flake, and fibrous particulate, such as particle board core material. If the smallest dimension of a combustible material is greater than 500 µm, it is unlikely that the material would be combustible fibers/flyings, as determined by test. Finely divided solids with lengths that are large compared to their diameter or thickness usually do not pass through a 500 µm sieve, yet when tested could potentially be determined to be explosible. [**499:**A.3.3.4.1]

Informational Note No. 3: See ASTM E1226, *Standard Test Method for Explosibility of Dust Clouds*, ISO 6184-1, *Explosion protection systems — Part 1: Determination of explosion indices of combustible dusts in air*, or UL 80079-20-2, *Explosive atmospheres — Part 20-2: Material characteristics — Combustible dusts test methods*, for procedures for determining the explosibility of dusts. A material that is found to not present an explosible mixture could still be an ignitible fiber/flying, as defined in this article. Historically, the explosibility condition has been described as presenting a flash fire or explosion hazard. It could be understood that the potential hazard due to the formation of an explosible mixture when suspended in air at standard atmospheric pressure and temperature would include ignition. [**499:**A.3.3.4.1]

Δ **Fibers/Flyings, Ignitible. (Ignitible Fibers/Flyings)** Fibers/flyings where any dimension is greater than 500 µm in nominal size, which are not likely to be in suspension in quantities to produce an explosible mixture, but could produce an ignitible layer fire hazard. [**499:**3.3.4.2] (CMP-14)

Informational Note No. 1: This definition and Informational Note No. 2 have been extracted from NFPA 499, *Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*. The NFPA 499 reference is in brackets. Only editorial changes were made to the extracted text to make it consistent with this code.

Informational Note No. 2: Section 500.5 of this code prescribes a Class III location as one where ignitible fibers/flyings are present, but not likely to be in suspension in the air in quantities sufficient to produce ignitible mixtures. This description addresses fibers/flyings that do not present a flash-fire hazard or explosion hazard by test. This could be because those fibers/flyings are too large or too agglomerated to be suspended in air in sufficient concentration, or at all, under typical test conditions. Alternatively, this could be because they burn so slowly that, when suspended in air, they do not propagate combustion at any concentration. In this document the zone classification system includes ignitible fibers/flyings as a fire hazard in a layer, which is not addressed in the IEC zone system (see IEC 60079-10-2, *Explosive atmospheres — Part 10-2: Classification of areas — Explosive dust atmospheres*). Where these are present, the user could also consider installation in accordance with Article 503 of this code. [**499:**A.3.3.4.2]

Δ **Field Evaluation Body (FEB).** An organization or part of an organization that performs field evaluations of electrical or other equipment. [**790:**3.3.4] (CMP-1)

Informational Note: See NFPA 790, *Standard for Competency of Third-Party Field Evaluation Bodies*, provides guidelines for establishing the qualification and competency of a body performing field evaluations of electrical products and assembles with electrical components.

Field Labeled (as applied to evaluated products). Equipment or materials to which has been attached a label, symbol, or other identifying mark of an FEB indicating the equipment or materials were evaluated and found to comply with requirements as described in an accompanying field evaluation report. [**790:**3.3.6] (CMP-1)

Fire Alarm Circuit. The portion of the wiring system between the load side of the overcurrent protective device (OCPD) or the power-limited supply and the connected equipment of all circuits powered and controlled by the fire alarm system. Fire alarm circuits are classified as either non-power-limited or power-limited. (CMP-3)

Fire Alarm Circuit, Non-Power-Limited (NPLFA). (Non-Power-Limited Fire Alarm Circuit) A fire alarm circuit powered by a source that is not power limited. (CMP-3)

Informational Note: See 760.41 and 760.43 for requirements for non-power-limited fire alarm circuits.

Fire Alarm Circuit, Power-Limited (PLFA). (Power-Limited Fire Alarm Circuit) A fire alarm circuit powered by a power-limited source . (CMP-3)

Informational Note: See 760.121 for requirements on power-limited fire alarm circuits.

Fitting. An accessory such as a locknut, bushing, or other part of a wiring system that is intended primarily to perform a mechanical rather than an electrical function. (CMP-1)

Δ **Fixed (as applied to equipment).** Equipment that is fastened or otherwise secured at a specific location. (CMP-1)

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Flameproof "d". Type of protection where the enclosure will withstand an internal explosion of a flammable mixture that has penetrated into the interior, without suffering damage and without causing ignition, through any joints or structural openings in the enclosure of an external explosive gas atmosphere consisting of one or more of the gases or vapors for which it is designed. (CMP-14)

Informational Note: See ANSI/UL 60079-1, *Explosive Atmospheres — Part 1: Equipment Protection by Flameproof Enclosures "d"*, for additional information.

Flammable Anesthetics. Gases or vapors, such as fluroxene, cyclopropane, divinyl ether, ethyl chloride, ethyl ether, and ethylene, that could form flammable or explosive mixtures with air, oxygen, or reducing gases such as nitrous oxide. (517) (CMP-15)

Flexible Bus Systems. An assembly of flexible insulated bus, with a system of associated fittings used to secure, support, and terminate the bus. (CMP-8)

Informational Note: Flexible bus systems are engineered systems for a specific site location and are ordinarily assembled at the point of installation from the components furnished or specified by the manufacturer.

Flexible Insulated Bus. A flexible rectangular conductor with an overall insulation. (CMP-8)

Flywheel ESS (FESS). A mechanical ESS composed of a spinning mass referred to as a rotor and an energy conversion mechanism such as a motor-generator that converts the mechanical energy to electrical energy. (706) (CMP-13)

Informational Note: There are primarily two types of rotor constructions, solid metal mass design and composite fiber design.

Footlight. A border light installed on or in the stage. (520) (CMP-15)

Forming Shell. A structure designed to support a wet-niche luminaire assembly and intended for mounting in a pool or fountain structure. (680) (CMP-17)

Fountain. An ornamental structure or recreational water feature from which one or more jets or streams of water are discharged into the air, including splash pads, ornamental pools, display pools, and reflection pools. The definition does not include drinking water fountains or water coolers. (680) (CMP-17)

Frame. Chassis rail and any welded addition thereto of metal thickness of 1.35 mm (0.053 in.) or greater. (551) (CMP-7)

Free Air (as applied to conductors). Open or ventilated environment that allows for heat dissipation and air flow around an installed conductor. (CMP-6)

Fuel Cell. An electrochemical system that consumes fuel to produce an electric current. In such cells, the main chemical reaction used for producing electric power is not combustion. However, there may be sources of combustion used within the overall cell system, such as reformers/fuel processors. (CMP-4)

Fuel Cell System. The complete aggregate of equipment used to convert chemical fuel into usable electricity and typically consisting of a reformer, stack, power inverter, and auxiliary equipment. (CMP-4)

Fuse. An overcurrent protective device (OCPD) with a circuit-opening fusible part that is heated and severed by the passage of overcurrent through it. (CMP-10)

Informational Note: A fuse comprises all the parts that form a unit capable of performing the prescribed functions. It may or may not be the complete device necessary to connect it into an electrical circuit.

Fuse, Electronically Actuated. (Electronically Actuated Fuse) An overcurrent protective device (OCPD) that generally consists of a control module that provides current-sensing, electronically derived time–current characteristics, energy to initiate tripping, and an interrupting module that interrupts current when an overcurrent occurs. Such fuses may or may not operate in a current-limiting fashion, depending on the type of control selected. (CMP-9)

Fuse, Expulsion. (Expulsion Fuse) A vented fuse unit in which the expulsion effect of gases produced by the arc and lining of the fuseholder, either alone or aided by a spring, extinguishes the arc. (CMP-10)

Fuse, Nonvented Power. (Nonvented Power Fuse) A fuse without intentional provision for the escape of arc gases, liquids, or solid particles to the atmosphere during circuit interruption. (CMP-10)

Fuse, Power. (Power Fuse) A vented, nonvented, or controlled vented fuse unit in which the arc is extinguished by being drawn through solid material, granular material, or liquid, either alone or aided by a spring. (CMP-10)

Fuse, Vented Power. (Vented Power Fuse) A fuse with provision for the escape of arc gases, liquids, or solid particles to the surrounding atmosphere during circuit interruption. (CMP-10)

Δ **Garage.** A building or portion of a building in which one or more self-propelled vehicles can be kept for use, sale, storage, rental, repair, exhibition, or demonstration purposes. (CMP-1)

Informational Note: See 511.1 for commercial garages, repair and storage.

Garage, Major Repair. (Major Repair Garage) A building or portions of a building where major repairs, such as engine overhauls, painting, body and fender work, welding or grinding, and repairs that require draining or emptying of the motor vehicle fuel tank are performed on motor vehicles, including associated floor space used for offices, parking, or showrooms. [**30A:**3.3.12.1] (CMP-14)

Garage, Minor Repair. (Minor Repair Garage) A building or portions of a building used for lubrication, inspection, and minor automotive maintenance work, such as engine tune-ups, replacement of parts, fluid changes (e.g., oil, antifreeze, transmission fluid, brake fluid, air-conditioning refrigerants), brake system repairs, tire rotation, and similar routine maintenance work, including the associated floor space used for offices, parking, or showrooms. [**30A:**3.3.12.2] (CMP-14)

General-Purpose Cables, Cable Routing Assemblies, and Raceways. Cables, cable routing assemblies, and raceways are suitable for general-purpose applications and are resistant to the spread of fire. (722) (CMP-3)

Generating Capacity, Inverter. (Inverter Generating Capacity) The sum of parallel-connected inverter maximum continuous output power at 40°C in watts, kilowatts, volt-amperes, or kilovolt-amperes. (CMP-4)

Generating Station. A plant wherein electric energy is produced by conversion from some other form of energy (e.g., chemical, nuclear, solar, wind, mechanical, or hydraulic) by means of suitable apparatus. (CMP-4)

Δ **Generator (Generator Set).** A machine that converts mechanical energy into electrical energy by means of a prime mover and alternator. (CMP-13)

Generator, On-Site Standby. (On-Site Standby Generator) A facility producing electric power on site as the alternate supply of electric power. It differs from an on-site power production facility in that it is not constantly producing power. (695) (CMP-13)

N **Generator Terminals.** The point of connection for the output conductors on the generator (generator set). (445) (CMP-13)

Grid Bus Rail. A combination of the busbar, the busbar support, and the structural suspended ceiling grid system. (393) (CMP-18)

Ground. The Earth. (CMP-5)

Ground Fault. An unintentional, electrically conductive connection between an ungrounded conductor of an electrical circuit and the normally non-current-carrying conductors, metal enclosures, metal raceways, metal equipment, or earth. (CMP-5)

Ground-Fault Circuit Interrupter (GFCI) (Class A GFCI). A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a ground-fault current exceeds the values established for a Class A device. (CMP-2)

Informational Note: See UL 943, *Ground-Fault Circuit-Interrupters*, for further information. Class A ground-fault circuit interrupters trip when the ground-fault current is 6 mA or higher and do not trip when the ground-fault current is less than 4 mA.

Ground-Fault Circuit Interrupter, Special Purpose (SPGFCI). (Special Purpose Ground-Fault Circuit Interrupter) A term used to refer to Class C, Class D, andClass E devices. (CMP-2)

Informational Note: See UL 943C, *Outline of Investigation for Special Purpose Ground-Fault Circuit-Interrupters*, for information on Class C, Class D, andClass E SPGFCIs.

N **Ground-Fault Circuit Interrupter, Special Purpose, Class C (Class C SPGFCI). (Class C Special Purpose Ground-Fault Circuit Interrupter)** A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a ground-fault current exceeds the values established for a Class C device. It is intended to be used in circuits with no conductor over 300 volts ac to ground where reliable equipment grounding or double insulation is provided. (CMP-2)

Informational Note No. 1: See UL 943C, *Outline of Investigation for Special Purpose Ground-Fault Circuit-Interrupters*. Class C ground-fault circuit interrupters trip when the ground-fault current is 20 mA or higher and do not trip when the ground-fault current is less than 15 mA.

Informational Note No. 2: To provide limited let-go protection, Class C ground-fault circuit interrupters can have a trip threshold greater than 6 mA but less than 15 mA.

N **Ground-Fault Circuit Interrupter, Special Purpose, Class D (Class D SPGFCI). (Class D Special Purpose Ground-Fault Circuit Interrupter)** A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a ground-fault current exceeds the values established for a Class D device. It is intended to be used in circuits with one or more conductors over 300 volts to ground and with specially sized reliable grounding to provide a low impedance path so that the voltage across the body during a fault does not exceed 150 volts. (CMP-2)

Informational Note: See UL 943C, *Outline of Investigation for Special Purpose Ground-Fault Circuit-Interrupters*. Class D ground-fault circuit interrupters trip when the ground-fault current is 20 mA or higher and do not trip when the ground-fault current is less than 15 mA.

N **Ground-Fault Circuit Interrupter, Special Purpose, Class E (Class E SPGFCI). (Class E Special Purpose Ground-Fault Circuit Interrupter)** A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a ground-fault current exceeds the values established for a Class E device. It is intended to be used in circuits with one or more conductors over 300 volts to ground and with conventional equipment grounding or double insulation provided for the protected equipment in the system. These devices respond rapidly to open the circuit before the magnitude and duration of the current flowing through the body exceeds the limits for ventricular fibrillation. (CMP-2)

Informational Note: See UL 943C, *Outline of Investigation for Special Purpose Ground-Fault Circuit-Interrupters*. Class E ground-fault circuit interrupters trip when the ground-fault current is 20 mA or higher and do not trip when the ground-fault current is less than 15 mA.

Ground-Fault Current Path. An electrically conductive path from the point of a ground fault on a wiring system through normally non-current-carrying conductors, grounded conductors, equipment, or the earth to the electrical supply source. (CMP-5)

Informational Note: Examples of ground-fault current paths are any combination of equipment grounding conductors, metallic raceways, metallic cable sheaths, electrical equipment, and any other electrically conductive material such as metal, water, and gas piping; steel framing members; stucco mesh; metal ducting; reinforcing steel; shields of communications cables; grounded conductors; and the earth itself.

Ground-Fault Current Path, Effective. (Effective Ground-Fault Current Path) An intentionally constructed, low-impedance electrically conductive path designed and intended to carry current during ground-fault events from the point of a ground fault on a wiring system to the electrical supply source and that facilitates the operation of the overcurrent protective device (OCPD) or ground-fault detectors. (CMP-5)

Ground-Fault Detector-Interrupter, dc (GFDI). A device that provides protection for PV system dc circuits by detecting a

ground fault and could interrupt the fault path in the dc circuit. (690) (CMP-4)

Informational Note: See UL 1741, *Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources*, and UL 62109, *Standard for Power Converters for use in Photovoltaic Power Systems*, for further information on GFDI equipment.

Ground-Fault Protection of Equipment (GFPE). A system intended to provide protection of equipment from damaging line-to-ground fault currents by operating to cause a disconnecting means to open all ungrounded conductors of the faulted circuit. This protection is provided at current levels less than those required to protect conductors from damage through the operation of a supply circuit overcurrent protective device (OCPD). (CMP-5)

Grounded (Grounding). Connected (connecting) to ground or to a conductive body that extends the ground connection. (CMP-5)

Grounded, Functionally. (Functionally Grounded) A system that has an electrical ground reference for operational purposes that is not solidly grounded. (CMP-4)

Informational Note: A functionally grounded system is often connected to ground through an electronic means internal to an inverter or charge controller that provides ground-fault protection. Examples of operational purposes for functionally grounded systems include ground-fault detection and performance-related issues for some power sources.

Grounded, Solidly. (Solidly Grounded) Connected to ground without inserting any resistor or impedance device. (CMP-5)

Grounded Conductor. A system or circuit conductor that is intentionally grounded. (CMP-5)

Informational Note: Although an equipment grounding conductor is grounded, it is not considered a grounded conductor.

Grounded System, Impedance. (Impedance Grounded System) An electrical system that is grounded by intentionally connecting the system neutral point to ground through an impedance device. (CMP-5)

Grounding Conductor, Equipment (EGC). (Equipment Grounding Conductor) A conductive path(s) that is part of an effective ground-fault current path and connects normally non-current-carrying metal parts of equipment together and to the system grounded conductor or to the grounding electrode conductor, or both. (CMP-5)

Informational Note No. 1: It is recognized that the equipment grounding conductor also performs bonding.

Informational Note No. 2: See 250.118 for a list of acceptable equipment grounding conductors.

Grounding Conductor, Impedance. (Impedance Grounding Conductor) A conductor that connects the system neutral point to the impedance device in an impedance grounded system. (CMP-5)

Grounding Electrode. A conducting object through which a direct connection to earth is established. (CMP-5)

Grounding Electrode Conductor (GEC). A conductor used to connect the system grounded conductor or the equipment to a grounding electrode or to a point on the grounding electrode system. (CMP-5)

Grouped. Cables or conductors positioned adjacent to one another but not in continuous contact with each other. (520) (CMP-15)

Guarded. Covered, shielded, fenced, enclosed, or otherwise protected by means of suitable covers, casings, barriers, rails, screens, mats, or platforms to remove the likelihood of approach or contact by persons or objects to a point of danger. (CMP-1)

Guest Room. An accommodation combining living, sleeping, sanitary, and storage facilities within a compartment. (CMP-2)

Guest Suite. An accommodation with two or more contiguous rooms comprising a compartment, with or without doors between such rooms, that provides living, sleeping, sanitary, and storage facilities. (CMP-2)

Gutter, Metal Auxiliary. (Metal Auxiliary Gutter) A sheet metal enclosure used to supplement wiring spaces at meter centers, distribution centers, switchgear, switchboards, and similar points of wiring systems. The enclosure has hinged or removable covers for housing and protecting electrical wires, cable, and busbars. The enclosure is designed for conductors to be laid or set in place after the enclosures have been installed as a complete system. (CMP-8)

Gutter, Nonmetallic Auxiliary. (Nonmetallic Auxiliary Gutter) A flame-retardant, nonmetallic enclosure used to supplement wiring spaces at meter centers, distribution centers, switchgear, switchboards, and similar points of wiring systems. The enclosure has hinged or removable covers for housing and protecting electrical wires, cable, and busbars. The enclosure is designed for conductors to be laid or set in place after the enclosures have been installed as a complete system. (CMP-8)

Habitable Room. A room in a building for living, sleeping, eating, or cooking, but excluding bathrooms, toilet rooms, closets, hallways, storage or utility spaces, and similar areas. (CMP-2)

Δ **Hand Fastened.** Mounting means of equipment in which the fastening means are specifically designed to permit removal without the use of a tool. (CMP-12)

Handhole Enclosure. An enclosure for use in underground systems, provided with an open or closed bottom, and sized to allow personnel to reach into, but not enter, for the purpose of installing, operating, or maintaining equipment or wiring or both. (CMP-8)

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:**3.3.74] (517) (CMP-15)

Hazard Current, Fault. (Fault Hazard Current) The hazard current of a given isolated power system with all devices connected except the line isolation monitor. [**99:**3.3.74.1] (517) (CMP-15)

Monitor Hazard Current. The hazard current of the line isolation monitor alone. [**99:**3.3.74.2] (517) (CMP-15)

Total Hazard Current. The hazard current of a given isolated system with all devices, including the line isolation monitor, connected. [**99:**3.3.74.3] (517) (CMP-15)

Header. Transverse metal raceways for electrical conductors, providing access to predetermined cells of a precast cellular concrete floor, thereby permitting the installation of electrical conductors from a distribution center to the floor cells. (CMP-8)

Health Care Facilities. Buildings, portions of buildings, or mobile enclosures in which human medical, dental, psychiatric, nursing, obstetrical, or surgical care is provided. [**99:**3.3.75] (CMP-15)

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.

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:**3.3.76] (517) (CMP-15)

Heating Equipment. Any equipment that is used for heating purposes and whose heat is generated by induction or dielectric methods. (665) (CMP-12)

Heating Panel. A complete assembly provided with a junction box or a length of flexible conduit for connection to a branch circuit. (CMP-17)

Heating Panel Set. A rigid or nonrigid assembly provided with nonheating leads or a terminal junction assembly identified as being suitable for connection to a wiring system. (CMP-17)

Δ **Heating System.** A complete system consisting of components such as heating elements, fastening devices, nonheating circuit wiring, leads, temperature controllers, safety signs, junction boxes, raceways, and fittings. (CMP-17)

Heating System, Impedance. (Impedance Heating System) A system in which heat is generated in an object, such as a pipe, rod, or combination of such objects serving as a heating element, by causing current to flow through such objects by direct connection to an ac voltage source from an isolating transformer. In some installations the object is embedded in the surface to be heated or constitutes the exposed component to be heated. (CMP-17)

Heating System, Induction. (Induction Heating System) A system in which heat is generated in a pipeline or vessel wall by inducing current in the pipeline or vessel wall from an external isolated ac field source. (CMP-17)

Heating System, Skin Effect. (Skin-Effect Heating System) A system in which heat is generated on the inner surface of a ferromagnetic envelope embedded in or fastened to the surface to be heated.

Informational Note: Typically, an electrically insulated conductor is routed through and connected to the envelope at the other end. The envelope and the electrically insulated conductor are connected to an ac voltage source from an isolating transformer. (CMP-17)

Hermetic Refrigerant Motor-Compressor. A combination consisting of a compressor and motor, both of which are enclosed in the same housing, with no external shaft or shaft seals, with the motor operating in the refrigerant. (CMP-11)

Hoistway. Any shaftway, hatchway, well hole, or other vertical opening or space in which an elevator or dumbwaiter is designed to operate. (CMP-12)

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**:3.3.156] (CMP-15)

Hydromassage Bathtub. A permanently installed bathtub equipped with a recirculating piping system, pump, and associated equipment. It is designed so it can accept, circulate, and discharge water upon each use. (680) (CMP-17)

Identified (as applied to equipment). Recognizable as suitable for the specific purpose, function, use, environment, application, and so forth, where described in a particular code requirement. (CMP-1)

Informational Note: Some examples of ways to determine suitability of equipment for a specific purpose, environment, or application include investigations by a qualified testing laboratory (listing and labeling), an inspection agency, or other organizations concerned with product evaluation.

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Increased Safety "e". Type of protection applied to electrical equipment that does not produce arcs or sparks in normal service and under specified abnormal conditions, in which additional measures are applied to give increased security against the possibility of excessive temperatures and of the occurrence of arcs and sparks. (CMP-14)

Informational Note: See ANSI/UL 60079-7, *Explosive Atmospheres — Part 7: Equipment Protection by Increased Safety "e"*, for additional information.

Induction Heating (Induction Melting) (Induction Welding). The heating, melting, or welding of a nominally conductive material due to its own I2R losses when the material is placed in a varying electromagnetic field. (665) (CMP-12)

Industrial Control Panel. An assembly of two or more components consisting of one of the following: (1) power circuit components only, such as motor controllers, overload relays, fused disconnect switches, and circuit breakers; (2) control circuit components only, such as push buttons, pilot lights, selector switches, timers, switches, and control relays; (3) a combination of power and control circuit components. These components, with associated wiring and terminals, are mounted on, or contained within, an enclosure or mounted on a subpanel. (CMP-11)

Informational Note: The industrial control panel does not include the controlled equipment.

Δ **Industrial Installation, Supervised. (Supervised Industrial Installation)** The industrial portions of a facility where all of the following conditions exist:

(1) Conditions of maintenance and engineering supervision ensure that only qualified persons monitor and service the system.
(2) The premises wiring system has 2500 kVA or greater of load used in industrial processes, manufacturing activities, or both, as calculated in accordance with Article 120 Parts II, III, IV, or V.
(3) The premises has at least one service or feeder that is more than 150 volts to ground and more than 300 volts phase-to-phase.

This definition excludes installations in buildings used by the industrial facility for offices, warehouses, garages, machine shops, and recreational facilities that are not an integral part of the industrial plant, substation, or control center. (240) (CMP-10)

Δ **Information Technology Equipment (ITE).** Equipment and systems rated 1000 volts or less, normally found in offices or other business establishments and similar environments classified as ordinary locations, that are used for creation and manipulation of data, voice, video, and similar signals. (CMP-12)

Informational Note: See UL 60950-1, *Information Technology Equipment — Safety — Part 1: General Requirements*, or UL 62368-1, *Audio/Video Information and Communication Technology Equipment Part 1: Safety Requirements*, for information on listing requirements for both information technology equipment and communications equipment.

Information Technology Equipment Room. A room within the information technology equipment area that contains the information technology equipment. [**75:**3.3.17] (CMP-12)

Innerduct. A nonmetallic raceway placed within a larger raceway. (CMP-16)

Insulated Bus Pipe (IBP). A cylindrical solid or hollow conductor with a solid insulation system, having conductive grading layers and a grounding layer imbedded in the insulation, and provided with an overall covering of insulating or metallic material. IBP is also referred to as tubular covered conductor (TCC). (CMP-8)

Insulated Bus Pipe System. An assembly that includes bus pipe, connectors, fittings, mounting structures, and other fittings and accessories. (CMP-8)

Insulating End. An insulator designed to electrically insulate the end of a flat conductor cable (Type FCC). (324) (CMP-6)

Interactive Mode (Interactive). The operating mode for power production sources or microgrids that operate in parallel with and are capable of delivering energy to an electric power production and distribution network or other primary power source. (CMP-4)

Informational Note: Interactive mode is an operational mode of both interactive systems and of equipment such as interactive inverters.

Interrupting Rating. The highest current at rated voltage that a device is identified to interrupt under standard test conditions. (CMP-10)

Informational Note: Equipment intended to interrupt current at other than fault levels may have its interrupting rating implied in other ratings, such as horsepower or locked rotor current.

Intersystem Bonding Termination (IBT). A device that provides a means for connecting intersystem bonding conductors for communications systems to the grounding electrode system. (CMP-16)

Intrinsic Safety "i". Type of protection where any spark or thermal effect is incapable of causing ignition of a mixture of flammable or combustible material in air under prescribed test conditions. (CMP-14)

Informational Note: See ANSI/UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*; and ANSI/UL 60079-11, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety "i"*, for additional information.

Intrinsically Safe Apparatus. Apparatus in which all the circuits are intrinsically safe. (CMP-14)

Informational Note No. 1: See ANSI/UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*, and ANSI/UL 60079-11, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety "i"*, for additional information.

Informational Note No. 2: See ANSI/ISA RP 12.06.01, *Recommended Practice for Wiring Methods for Hazardous (Classified) Locations Instrumentation — Part 1: Intrinsic Safety*, for installation information.

Intrinsically Safe Circuit. A circuit in which any spark or thermal effect is incapable of causing ignition of a mixture of flammable or combustible material in air under prescribed test conditions. (CMP-14)

Informational Note: See ANSI/UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*, and ANSI/UL 60079-11, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety "i"*, for test conditions.

Intrinsically Safe Circuits, Different. (Different Intrinsically Safe Circuits) Intrinsically safe circuits in which the possible interconnections have not been evaluated and identified as intrinsically safe. (CMP-14)

Informational Note: See ANSI/UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*, and ANSI/UL 60079-11, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety "i"*, for additional information.

Intrinsically Safe System. An assembly of interconnected intrinsically safe apparatus, associated apparatus, and interconnecting cables, in which those parts of the system that might be used in hazardous (classified) locations are intrinsically safe circuits. (CMP-14)

Informational Note No. 1: An intrinsically safe system might include more than one intrinsically safe circuit.

Informational Note No. 2: See ANSI/UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*; ANSI/UL 60079-11, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety "i"*; and ANSI/UL 60079-25, *Explosive Atmospheres — Part 25: Intrinsically Safe Electrical Systems*, for additional information.

Informational Note No. 3: See ANSI/ISA RP 12.06.01, *Recommended Practice for Wiring Methods for Hazardous (Classified) Locations Instrumentation — Part 1: Intrinsic Safety*, for installation information.

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:**3.3.94] (517) (CMP-15)

Inverter. Equipment that changes dc to ac. (CMP-4)

Inverter, Interactive. (Interactive Inverter) Inverter equipment having the capability to operate only in interactive mode. (CMP-4)

Inverter, Multimode. (Multimode Inverter) Inverter equipment capable of operating in both interactive and island modes. (CMP-4)

Inverter, Stand-alone. (Stand-alone Inverter) Inverter equipment having the capabilities to operate only in island mode. (CMP-4)

Inverter Input Circuit. Conductors connected to the dc input of an inverter. (CMP-4)

Inverter Output Circuit. Conductors connected to the ac output of an inverter. (CMP-4)

Inverter Utilization Output Circuit. Conductors between the multimode or stand-alone inverter and utilization equipment. (706) (CMP-13)

Irrigation Machine. An electrically driven or controlled machine, with one or more motors, not hand-portable, and used primarily to transport and distribute water for agricultural purposes. (675) (CMP-7)

Irrigation Machine, Center Pivot. (Center Pivot Irrigation Machine) A multimotored irrigation machine that revolves around a central pivot and employs alignment switches or similar devices to control individual motors. (675) (CMP-7)

Island Mode. The operating mode for power production sources or microgrids that allows energy to be supplied to loads that are disconnected from an electric power production and distribution network or other primary power source. (CMP-4)

Isolated (as applied to location). Not readily accessible to persons unless special means for access are used. (CMP-1)

Isolated Power System. A system comprising an isolation transformer or its equivalent, a line isolation monitor, and its ungrounded circuit conductors. [**99:**3.3.96] (517) (CMP-15)

Isolation Transformer. A transformer of the multiple-winding type, with the primary and secondary windings physically separated, that inductively couples its ungrounded secondary winding to the grounded feeder system that energizes its primary winding. [**99:**3.3.97] (517) (CMP-15)

Kitchen. An area with a sink and permanent provisions for food preparation and cooking. (CMP-2)

Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner. (CMP-1)

Informational Note: If a listed product is of such a size, shape, material, or surface texture that it is not possible to apply legibly the complete label to the product, the complete label may appear on the smallest unit container in which the product is packaged.

N **Lampholder.** A contact device that makes an electrical connection to a lamp. (CMP-18)

Laundry Area. An area containing or designed to contain a laundry tray, clothes washer, or clothes dryer. (CMP-2)

Leakage-Current Detector-Interrupter (LCDI). A device provided in a power supply cord or cord set that senses leakage current flowing between or from the cord conductors and interrupts the circuit at a predetermined level of leakage current. (440) (CMP-11)

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Legally Required Standby Systems. Those systems required and so classed as legally required standby by municipal, state, federal, or other codes or by any governmental agency having jurisdiction. These systems are intended to automatically supply power to selected loads (other than those classed as emergency systems) in the event of failure of the normal source. (CMP-13)

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:**3.3.100] (517) (CMP-15)

Lighting Assembly, Cord- andPlug-Connected. (Cord- andPlug-Connected Lighting Assembly) A lighting assembly consisting of a luminaire intended for installation in the wall of a spa, hot tub, or storable pool, and a cord- andplug-connected transformer or power supply. (680) (CMP-17)

Lighting Assembly, Through-Wall. (Through-Wall Lighting Assembly) A lighting assembly intended for installation above grade, on or through the wall of a pool, consisting of two interconnected groups of components separated by the pool wall. (680) (CMP-17)

Lighting Outlet. An outlet intended for the direct connection of a lampholder or luminaire. (CMP-18)

Lighting Track. (Track Lighting) A manufactured assembly designed to support and energize luminaires that are capable of being readily repositioned on the track. Its length can be altered by the addition or subtraction of sections of track. (CMP-18)

Limited Care Facility. A building or portion of a building 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 intellectual disability/developmental disability, mental illness, or chemical dependency. [**101:**3.3.95.2] (CMP-15)

N **Limited-Energy System.** The equipment and cables of an end-to-end system that are either power-restricted or capable of limiting or shutting down the power source to prevent deviations above normal operating limits to mitigate hazards related to electric shock and fire. (CMP-3)

Informational Note: Examples of limited-energy systems include Class 2, Class 3, Class 4, power-limited fire alarm (PLFA), and communications systems.

Δ **Limited Finishing Workstation.** A power-ventilated apparatus that is capable of confining the vapors, mists, residues, dusts, or deposits that are generated by a limited spray application process. Such apparatus is not a spray booth or spray room, as herein defined. [**33:**3.3.25.1] (CMP-14)

Informational Note: See NFPA 33, *Standard for Spray Application Using Flammable or Combustible Materials*, Section 14.3 for information on limited finishing workstations.

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:**3.3.102] (517) (CMP-15)

N **Line-To-Ground.** An electrical reference between a current-carrying conductor other than a neutral conductor and an

equipment grounding conductor, grounded equipment, or ground. (CMP-1)

N **Line-to-Line.** An electrical reference between two current-carrying conductors in a circuit other than a neutral conductor. (CMP-1)

N **Line-to-Neutral.** An electrical reference between a current-carrying conductor, other than a neutral conductor, and a neutral conductor or neutral point in a circuit. (CMP-1)

Liquid Immersion "o". Type of protection where electrical equipment is immersed in a protective liquid so that an explosive atmosphere that might be above the liquid or outside the enclosure cannot be ignited. (CMP-14)

Informational Note: See ANSI/UL 60079-6, *Explosive Atmospheres — Part 6: Equipment Protection by Liquid Immersion "o"*, for additional information.

Listed. Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose. (CMP-1)

Informational Note: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. Use of the system employed by the listing organization allows the authority having jurisdiction to identify a listed product.

Live Parts. Energized conductive components. (CMP-1)

Δ **Load Management.** The process within an energy management system that limits the total electrical load on an electrical supply system to a set value by adjusting or controlling circuits supplying the load or individual loads. (CMP-13)

Location, Anesthetizing. (Anesthetizing Location) Any space within a facility that has been designated for the administration of any flammable or nonflammable inhalation anesthetic agent during examination or treatment, including the use of such agents for relative analgesia. (517) (CMP-15)

Location, Anesthetizing, Flammable. (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. (517) (CMP-15)

Location, Damp. (Damp Location) Locations protected from weather and not subject to saturation with water or other liquids but subject to moderate degrees of moisture. (CMP-1)

Informational Note: Examples of such locations include partially protected locations under canopies, marquees, roofed open porches, and like locations, and interior locations subject to moderate degrees of moisture, such as some basements, some barns, and some cold-storage warehouses.

Location, Dry. (Dry Location) A location not normally subject to dampness or wetness. A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction. (CMP-1)

Location, Remote. (Remote Location) A location, other than a motion picture or television studio, where a production is filmed or recorded. (530) (CMP-15)

Δ **Location, Wet. (Wet Location)** A location that is one or more of the following:

(1) Unprotected and exposed to weather
(2) Subject to saturation with water or other liquids
(3) Underground
(4) In concrete slabs or masonry in direct contact with the earth

(CMP-1)

Informational Note: A vehicle washing area is an example of a wet location saturated with water or other liquids.

Location, Wet Procedure. (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:**3.3.195] (517) (CMP-15)

Informational Note: Routine housekeeping procedures and incidental spillage of liquids do not define a wet procedure location. [**99:**A.3.3.187]

Locations, Hazardous (Classified). [Hazardous (Classified) Locations] Locations where fire or explosion hazards might exist due to flammable gases, flammable liquid–produced vapors, combustible liquid–produced vapors, combustible dusts, combustible fiber/flyings, or ignitible fibers/flyings. (CMP-14)

Locations, Unclassified. (Unclassified Locations) Locations determined to be neither Class I, Division 1; Class I, Division 2; Zone 0; Zone 1; Zone 2; Class II, Division 1; Class II, Division 2; Class III, Division 1; Class III, Division 2; Zone 20; Zone 21; Zone 22; nor any combination thereof. (CMP-14)

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Δ **Long-Time Rating.** A rating based on an operating interval of 5 minutes or longer. (CMP-15)

Loudspeaker (Speaker). Equipment that converts an ac electric signal into an acoustic signal. (640) (CMP-12)

Δ **Low-Voltage Contact Limit.** A voltage not exceeding the following values:

(1) 15 volts (RMS) for sinusoidal ac
(2) 21.2 volts peak for nonsinusoidal ac
(3) 30 volts for continuous dc
(4) 12.4 volts peak for dc that is interrupted at a rate of 10 to 200 Hz

(CMP-17)

Low-Voltage Suspended Ceiling Power Distribution System. A system that serves as a support for a finished ceiling surface and consists of a busbar and busbar support system to distribute power to utilization equipment supplied by a Class 2 power supply. (393) (CMP-18)

Luminaire. Utilization equipment intended to illuminate a space or object(s), to facilitate visual tasks, activities, aesthetics, or security, or a similar purpose. Light-emitting devices such as lamps or LED modules could be removable or replaceable. The equipment can connect directly to the branch circuit (ac or dc) or be used with a separate power source that regulates the voltage, current, or both from the branch circuit. (CMP-18)

N **Luminaire, Directly Controlled (DCL).** A luminaire containing a control input for a dimming or switching function. (700) (CMP-13)

Luminaire, Dry-Niche. (Dry-Niche Luminaire) A luminaire intended for installation in the floor or wall of a pool, spa, or fountain in a niche that is sealed against the entry of water. (680) (CMP-17)

Luminaire, No-Niche. (No-Niche Luminaire) A luminaire intended for installation above or below the water without a niche. (680) (CMP-17)

Luminaire, Wet-Niche. (Wet-Niche Luminaire) A luminaire intended for installation in a forming shell mounted in a pool or fountain structure where the luminaire will be completely surrounded by water. (680) (CMP-17)

Machine Room. An enclosed machinery space outside the hoistway, intended for full bodily entry, that contains the electrical driving machine or the hydraulic machine. The room could also contain electrical and/or mechanical equipment used directly in connection with the elevator or dumbwaiter. (620) (CMP-12)

Machine Room and Control Room, Remote. (Remote Machine Room and Control Room) A machine room or control room that is not attached to the outside perimeter or surface of the walls, ceiling, or floor of the hoistway. (620) (CMP-12)

Machinery, Industrial (Industrial Machine). (Industrial Machinery) A power-driven machine (or a group of machines working together in a coordinated manner), not portable by hand while working, that is used to process material by cutting; forming; pressure; electrical, thermal, or optical techniques; lamination; or a combination of these processes. It can include associated equipment used to transfer material or tooling, including fixtures, to assemble/disassemble, to inspect or test, or to package. The associated electrical equipment, including the logic controller(s) and associated software or logic together with the machine actuators and sensors, are considered as part of the industrial machine. (CMP-12)

Machinery Space. A space inside or outside the hoistway, intended to be accessed with or without full bodily entry, that contains the elevator, dumbwaiter, platform lift, or stairway chairlift equipment and could also contain equipment used directly in connection with the elevator, dumbwaiter, platform lift, or stairway chairlift. (620) (CMP-12)

Machinery Space and Control Space, Remote. (Remote Machinery Space and Control Space) A machinery space or control space that is not within the hoistway, machine room, or control room and that is not attached to the outside perimeter or surface of the walls, ceiling, or floor of the hoistway. (620) (CMP-12)

Δ **Manufactured Home.** A structure, transportable in one or more sections, which in the traveling mode is 2.4 m (8 ft) or more in width or 12.2 m (40 ft) or more in length, or when erected on site is 29.77 m^2 (320 ft^2) or more is built on a permanent chassis and is designed to be used as a dwelling with or without a permanent foundation, whether or not connected to the utilities, and includes plumbing, heating, air-conditioning, and electrical systems contained therein. The term includes any structure that meets all the requirements of this paragraph except the size requirements and with respect to which the manufacturer voluntarily files a certification required by the regulatory agency. Calculations used to determine the number of square meters (square feet) in a structure are based on the structure's exterior dimensions and include all expandable rooms, cabinets, and other projections containing interior space, but do not include bay windows. (CMP-7)

Informational Note No. 1: Unless otherwise indicated, the term *mobile home* includes manufactured home and excludes park trailers.

Informational Note No. 2: See the applicable building code for definition of the term *permanent foundation*.

Informational Note No. 3: See 24 CFR Part 3280, *Manufactured Home Construction and Safety Standards, of the Federal Department of Housing and Urban Development*, for additional information on the definition.

Manufactured Wiring System. A system containing component parts that are assembled in the process of manufacture and cannot be inspected at the building site without damage or destruction to the assembly and used for the connection of luminaires, utilization equipment, continuous plug-in type busways, and other devices. (604) (CMP-7)

Marina. A facility, generally on the waterfront, that stores and services boats in berths, on moorings, and in dry storage or dry stack storage. [**303:**3.3.13] (555) (CMP-7)

Maximum Output Power. The maximum power delivered by an amplifier into its rated load as determined under specified test conditions. (640) (CMP-12)

Informational Note: The maximum output power can exceed the manufacturer's rated output power for the same amplifier.

Maximum Output Power (as applied to wind electric systems). The maximum 1-minute average power output a wind turbine produces in normal steady-state operation (instantaneous power output can be higher). (694) (CMP-4)

Maximum Voltage. The greatest difference in potential produced between any two conductors of a wind turbine circuit. (694) (CMP-4)

Maximum Water Level. The highest level that water can reach before it spills out. (680) (CMP-17)

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

(1) Examinations and minor treatments/procedures performed under the continuous supervision of a medical professional;
(2) 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 operations.

[**99:**3.3.114] (CMP-15)

Δ **Membrane Enclosure.** A temporary enclosure used for the spraying of workpieces that cannot be moved into a spray booth where open spraying is not practical due to proximity to other operations, finish quality, or concerns such as the collection of overspray. (CMP-14)

Informational Note: See NFPA 33, *Standard for Spray Application Using Flammable or Combustible Materials*, Chapter 18 for information on the construction and use of membrane enclosures.

Δ **Messenger-Supported Wiring.** An exposed wiring support system using a messenger wire to support insulated conductors by any one of the following:

(1) A messenger with rings and saddles for conductor support
(2) A messenger with a field-installed lashing material for conductor support
(3) Factory-assembled aerial cable
(4) Multiplex cables utilizing a bare conductor, factory assembled and twisted with one or more insulated conductors, such as duplex, triplex, or quadruplex type of construction

(CMP-6)

Messenger Wire (Messenger). A wire that is run along with or integral with a cable or conductor to provide mechanical support for the cable or conductor. (CMP-6)

Metal Shield Connections. Means of connection for flat conductor cables (Type FCC) designed to electrically and mechanically connect a metal shield to another metal shield, to a receptacle housing or self-contained device, or to a transition assembly. (324) (CMP-6)

N **Metering Centers (Meter Center).** Panelboards in enclosures also containing one or more meter sockets. (CMP-10)

Δ **Microgrid.** An electric power system containing interconnected power production sources and capable of acting as a primary source independent of an electric utility. (CMP-4)

Informational Note: Examples of power sources in microgrids include photovoltaic systems, generators, fuel cell systems, wind electric systems, energy storage systems, electric vehicles used as a source of supply, and electrical power conversion from other energy sources.

Microgrid, Health Care (Health Care Microgrid System). (Health Care Microgrid) A group of interconnected loads and distributed energy resources within clearly defined boundaries that acts as a single controllable entity with respect to the utility. [**99:**3.3.77] (517) (CMP-15)

Microgrid Control System (MCS). A structured control system that manages microgrid operations, functionalities for utility interoperability, islanded operations, and transitions. (CMP-4)

Informational Note: MCS differ from multiple standby generators or uninterruptible power supplies that are evaluated and rated to operate as a single source of backup power upon loss of the primary power source. MCS functions include coordination, transitions, and interoperability between multiple power sources.

Microgrid Interconnect Device (MID). A device that enables a microgrid system to separate from and reconnect to an interconnected primary power source. (CMP-4)

Mixer. Equipment used to combine and level match a multiplicity of electronic signals, such as from microphones, electronic instruments, and recorded audio. (640) (CMP-12)

Mobile. X-ray equipment mounted on a permanent base with wheels and/or casters for moving while completely assembled. (660) (CMP-12)

Mobile Home. A factory-assembled structure or structures transportable in one or more sections that are built on a permanent chassis and designed to be used as a dwelling without a permanent foundation where connected to the required utilities and that include the plumbing, heating, air-conditioning, and electrical systems contained therein. (CMP-7)

Informational Note: Unless otherwise indicated, the term *mobile home* includes manufactured home and excludes park trailers.

Mobile Home Lot. A designated portion of a mobile home park designed for the accommodation of one mobile home and its accessory buildings or structures for the exclusive use of its occupants. (550) (CMP-7)

Mobile Home Park. A contiguous parcel of land that is used for the accommodation of mobile homes that are intended to be occupied. (550) (CMP-7)

Module, AC. (AC Module) A complete, environmentally protected unit consisting of solar cells, inverter, and other components, designed to produce ac power. (690) (CMP-4)

Module System, AC. (AC Module System) An assembly of ac modules, wiring methods, materials, and subassemblies that are evaluated, identified, and defined as a system. (690) (CMP-4)

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Δ **Momentary Rating.** A rating based on an operating interval that does not exceed 5 seconds. (CMP-15)

Monitor. An electrical or electronic means to observe, record, or detect the operation or condition of the electric power system or apparatus. (130) (CMP-13)

Monopole Circuit. An electrical subset of a PV system that has two conductors in the output circuit, one positive (+) and one negative (−). (690) (CMP-4)

Monorail. Overhead track and hoist system for moving material around the boatyard or moving and launching boats. [**303:**3.3.16] (555) (CMP-7)

Mooring(s). Any place where a boat is wet stored or berthed. [**303:**3.3.17] (555) (CMP-7)

Motion Picture Studio (Television Studio). A building, group of buildings, other structures, and outdoor areas designed, constructed, permanently altered, designated, or approved for the purpose of motion picture or television production. (530) (CMP-15)

Motor Control Center. An assembly of one or more enclosed sections having a common power bus and principally containing motor control units. (CMP-11)

Motor Fuel Dispensing Facility. That portion of a property where motor fuels are stored and dispensed from fixed equipment into the fuel tanks of motor vehicles or marine craft or into approved containers, including all equipment used in connection therewith. [**30A:**3.3.11] (CMP-14)

Informational Note: See 511.1 with respect to electrical wiring and equipment for other areas used as lubritoriums, service rooms, repair rooms, offices, salesrooms, compressor rooms, and similar locations.

Multicircuit Cable Outlet Enclosure. An enclosure containing one or more multicircuit plugs, receptacles, or both. (520) (CMP-15)

Multioutlet Assembly. A surface, flush, or freestanding assemblage with a raceway and fittings or other enclosure provided with one or more receptacles, for the purpose of supplying power to utilization equipment. (CMP-18)

Nacelle. An enclosure housing the alternator and other parts of a wind turbine. (694) (CMP-4)

Neon Tubing. Electric-discharge luminous tubing, including cold cathode luminous tubing, that is manufactured into shapes to illuminate signs, form letters, parts of letters, skeleton tubing, outline lighting, other decorative elements, or art forms and filled with various inert gases. (600) (CMP-18)

Network Interface Unit (NIU). A device that converts a broadband signal into component voice, audio, video, data, and interactive services signals and provides isolation between the network power and the premises signal circuits. These devices often contain primary and secondary protectors. (CMP-16)

Network Terminal. A device that converts network-provided signals (optical, electrical, or wireless) into component signals, including voice, audio, video, data, wireless, optical, and interactive services, and is considered a network device on the premises that is connected to a communications service provider and is powered at the premises. (CMP-16)

Neutral Conductor. The conductor connected to the neutral point of a system that is intended to carry current under normal conditions. (CMP-5)

Neutral Point. The common point on a wye-connection in a polyphase system or midpoint on a single-phase, 3-wire system, or midpoint of a single-phase portion of a 3-phase delta system, or a midpoint of a 3-wire, dc system. (CMP-5)

Informational Note: At the neutral point of the system, the vectorial sum of the nominal voltages from all other phases within the system that utilize the neutral, with respect to the neutral point, is zero potential.

Nonautomatic. Requiring human intervention to perform a function. (CMP-1)

Nonincendive Circuit. A circuit, other than field wiring, in which any arc or thermal effect produced under intended operating conditions of the equipment, is not capable, under specified test conditions, of igniting the flammable gas–air, vapor–air, or dust–air mixture. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

Nonincendive Component. A component having contacts for making or breaking an incendive circuit and the contacting mechanism is constructed so that the component is incapable of igniting the specified flammable gas–air or vapor–air mixture. The housing of such a component is not intended to exclude the flammable atmosphere or contain an explosion. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

Nonincendive Equipment. Equipment having electrical/electronic circuitry that is incapable, under normal operating conditions, of causing ignition of a specified flammable gas–air, vapor–air, or dust–air mixture due to arcing or thermal means. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

Nonincendive Field Wiring. Wiring that enters or leaves an equipment enclosure and, under normal operating conditions of the equipment, is not capable, due to arcing or thermal effects, of igniting the flammable gas–air, vapor–air, or dust–air mixture. Normal operation includes opening, shorting, or grounding the field wiring. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

Nonincendive Field Wiring Apparatus. Apparatus intended to be connected to nonincendive field wiring. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

Nonlinear Load. A load where the wave shape of the steady-state current does not follow the wave shape of the applied voltage. (CMP-1)

Informational Note: Electronic equipment, electronic/electric-discharge lighting, adjustable-speed drive systems, and similar equipment may be nonlinear loads.

Nonmetallic Extension. An assembly of two insulated conductors within a nonmetallic jacket or an extruded thermoplastic covering. The classification includes surface extensions intended for mounting directly on the surface of walls or ceilings. (CMP-6)

Nonsparking. Constructed to minimize the risk of arcs or sparks capable of creating an ignition hazard during conditions of normal operation. (CMP-14)

Informational Note No. 1: The term nonsparking is also referred to as nonarcing.

Informational Note No. 2: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

Normal/Emergency Power Source. A power source on the output side of a transfer switch or uninterruptible power supply that is automatically available upon loss of normal power. (700) (CMP-13).

Δ **Normal High-Water Level (as applies to electrical datum plane distances).** Natural or Artificially Made Shorelines: An elevation delineating the highest water level that has been maintained for a sufficient period of time to leave evidence upon the landscape, commonly the point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial.

Rivers and Streams: The elevation of the top of the bank of the channel. Streams, rivers, and tributaries that are prone to flooding and effects of water runoff shall consider the "bankfull stage" where an established gauge height at a given location along a river or stream, above which a rise in water surface will cause the river or stream to overflow the lowest natural stream bank somewhere in the corresponding reach.

Flood Control Bodies of Water: The flood pool maximum water surface elevation of a reservoir, equal to the elevation of the spillway.

Nonflood Control Bodies of Water: The flowage easement boundary in which the highest water surface elevation defined by the area existing between governmental-owned property line(s) and a contour line with perpetual rights to flood the area in connection with the operation of the reservoir. (CMP-7)

Nurses' Station. A space intended to provide a center of nursing activity for a group of nurses serving bed patients, where patient calls are received, nurses 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 spaces are considered a to be parts of the nurses' station. (517) (CMP-15)

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:**3.3.154.2] (CMP-15)

Office Furnishing. Cubicle panels, partitions, study carrels, workstations, desks, shelving systems, and storage units that may be mechanically and electrically interconnected to form an office furnishing system. (CMP-18)

Oil Immersion. Electrical equipment immersed in a protective liquid so that an explosive atmosphere that might be above the liquid or outside the enclosure cannot be ignited. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

Open Wiring on Insulators. An exposed wiring method using cleats, knobs, tubes, and flexible tubing for the protection and support of single insulated conductors run in or on buildings. (CMP-6)

Operating Device. The car switch, pushbuttons, key or toggle switch(s), or other devices used to activate the operation controller. (620) (CMP-12)

Operator. The individual responsible for starting, stopping, and controlling an amusement ride or supervising a concession. (525) (CMP-15)

Optical Radiation. Electromagnetic radiation at wavelengths in vacuum between the region of transition to X-rays and the region of transition to radio waves that is approximately between 1 nm and 1000 μm. (CMP-14)

Informational Note: See ANSI/UL 60079-28, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*, for information on types of protection that can be applied to minimize the risk of ignition in explosive atmospheres from optical radiation in the wavelength range from 380 nm to 10 μm.

Optical Radiation, Inherently Safe "op is". (Inherently Safe Optical Radiation "op is") Type of protection to minimize the risk of ignition in explosive atmospheres from optical radiation where visible or infrared radiation is incapable of producing sufficient energy under normal or specified fault conditions to ignite a specific explosive atmosphere. (CMP-14)

Informational Note: See ANSI/UL 60079-28, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*, for additional information.

Optical Radiation, Protected "op pr". (Protected Optical Radiation "op pr") Type of protection to minimize the risk of ignition in explosive atmospheres from optical radiation where visible or infrared radiation is confined inside optical fiber or other transmission medium under normal constructions or constructions with additional mechanical protection based on the assumption that there is no escape of radiation from the confinement. (CMP-14)

Informational Note: See ANSI/UL 60079-28, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*, for additional information.

Optical System With Interlock "op sh". Type of protection to minimize the risk of ignition in explosive atmospheres from optical radiation where visible or infrared radiation is confined inside optical fiber or other transmission medium with interlock cutoff provided to reliably reduce the unconfined beam strength to safe levels within a specified time in case the confinement fails and the radiation becomes unconfined. (CMP-14)

Informational Note: See ANSI/UL 60079-28, *Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation*, for additional information.

Optional Standby Systems. Those systems intended to supply power to public or private facilities or property where life safety does not depend on the performance of the system. These systems are intended to supply on-site generated or stored power to selected loads either automatically or manually. (CMP-13)

Organ, Electronic. (Electronic Organ) A musical instrument that imitates the sound of a pipe organ by producing sound electronically. (CMP-12)

Informational Note: Most new electronic organs produce sound digitally and are called digital organs.

Organ, Pipe. (Pipe Organ) A musical instrument that produces sound by driving pressurized air (called *wind*) through pipes selected via a keyboard. (CMP-12)

Organ, Pipe Sounding Apparatus. (Pipe Organ Sounding Apparatus) (Pipe Organ Chamber). The sound-producing part of a pipe organ, including, but not limited to, pipes, chimes, bells, the pressurized air- (wind-) producing equipment (blower), associated controls, and power equipment. (CMP-12)

Outlet. A point on the wiring system at which current is taken to supply utilization equipment. (CMP-1)

Outlet Box Hood. A housing shield intended to fit over a faceplate for flush-mounted wiring devices, or an integral component of an outlet box or of a faceplate for flush-mounted wiring devices. The hood does not serve to complete the electrical enclosure; it reduces the risk of water coming in contact with electrical components within the hood, such as attachment plugs, current taps, surge protective devices, direct plug-in transformer units, or wiring devices. (CMP-18)

Outline Lighting. An arrangement of incandescent lamps, electric-discharge lighting, or other electrically powered light sources to outline or call attention to certain features such as the shape of a building or the decoration of a window. (CMP-18)

Output Cable to the Electric Vehicle. An assembly consisting of a length of flexible EV cable and an electric vehicle connector (supplying power to the electric vehicle). (625) (CMP-12)

Output Cable to the Primary Pad. A multiconductor, shielded cable assembly consisting of conductors to carry the high-frequency energy and any status signals between the charger power converter and the primary pad. (625) (CMP-12)

Overcurrent. Any current in excess of the rated current of equipment or the ampacity of a conductor. It may result from overload, short circuit, or ground fault. (CMP-10)

Informational Note: A current in excess of rating may be accommodated by certain equipment and conductors for a given set of conditions. Therefore, the rules for overcurrent protection are specific for particular situations.

N **Overcurrent Protection.** Automatic interruption of one or more types of overcurrent. (CMP-10)

Δ **Overcurrent Protective Device (OCPD).** A device capable of providing protection over the full range of overcurrent between its rated current and its interrupting rating. (CMP-10)

Informational Note No. 1: In prior editions of this code, the term *branch-circuit overcurrent protective device* included devices suitable for providing protection for service, feeder, and branch circuits. The term has been revised to a more generalized *overcurrent protective device (OCPD)*. The specific requirements using this term can include modifiers (e.g., branch OCPD, feeder OCPD, service OCPD) to specify location or application of the OCPD, or to specify variations (e.g., supplementary OCPD).

Informational Note No. 2: See 240.7 for a list of OCPDs suitable for providing protection for service, feeder, branch circuits, and equipment.

Overcurrent Protective Device, Supplementary. (Supplementary Overcurrent Protective Device) (Supplementary OCPD) A device intended to provide limited overcurrent protection for specific applications and utilization equipment such as luminaires and appliances. This limited protection is in addition to the required overcurrent protective device (OCPD) for the branch circuit. (CMP-10)

Overhead Gantry. A structure consisting of horizontal framework, supported by vertical columns spanning above electrified truck parking spaces, that supports equipment, appliances, raceway, and other necessary components for the purpose of supplying electrical, HVAC, internet, communications, and other services to the spaces. (626) (CMP-12)

Overload. Operation of equipment in excess of normal, full-load rating, or of a conductor in excess of its ampacity that, when it persists for a sufficient length of time, would cause damage or dangerous overheating. A fault, such as a short circuit or ground fault, is not an overload. (CMP-10)

Packaged Therapeutic Tub or Hydrotherapeutic Tank Equipment Assembly. A factory-fabricated unit consisting of water-circulating, heating, and control equipment mounted on a common base, intended to operate a therapeutic tub or hydrotherapeutic tank. Equipment can include pumps, air blowers, heaters, lights, controls, sanitizer generators, and so forth. (680) (CMP-17)

Panelboard. A single panel or group of panel units designed for assembly in the form of a single panel, including buses and automatic overcurrent protective devices (OCPDs), and equipped with or without switches for the control of light, heat, or power circuits; designed to be placed in a cabinet, enclosure, or cutout box placed in or against a wall, partition, or other support; and accessible only from the front. (CMP-10)

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Park Electrical Wiring Systems. All of the electrical wiring, luminaires, equipment, and appurtenances related to electrical installations within a mobile home park, including the mobile home service equipment. (550) (CMP-7)

Park Trailer. A unit that is built on a single chassis mounted on wheels and has a gross trailer area not exceeding 37 m^2 (400 ft^2) in the set-up mode. (552) (CMP-7)

Part-Winding Motors. A part-winding start induction or synchronous motor is one that is arranged for starting by first energizing part of its primary (armature) winding and, subsequently, energizing the remainder of this winding in one or more steps. A standard part-winding start induction motor is arranged so that one-half of its primary winding can be energized initially, and, subsequently, the remaining half can be energized, both halves then carrying equal current. (CMP 11)

Informational Note: A hermetic refrigerant motor-compressor is not considered a standard part-winding start induction motor.

Passenger Transportation Facilities. Any area open to the public associated with passenger transportation such as an airport, bus terminal, highway rest stop and service area, marina, seaport, ferry slip, subway station, train station, or port of entry. (CMP-18)

Patient Bed Location. The location of a patient sleeping bed, or the bed or procedure table of a Category 1 space. [**99:**3.3.143] (CMP-15)

Patient Care–Related Electrical Equipment. Electrical equipment appliance that is intended to be used for diagnostic, therapeutic, or monitoring purposes in a patient care vicinity. [**99:**3.3.144] (517) (CMP-15)

Patient Care Space Category. Any space of a health care facility wherein patients are intended to be examined or treated. [**99:**3.3.145] (517) (CMP-15)

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

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.3.3.150]

Δ *Category 1 Space (Category 1).* Space in which failure of equipment or a system is likely to cause major injury or death of patients, staff, or visitors. [**99:**3.3.145.1] (517) (CMP-15)

Informational Note: These spaces, formerly known as critical care rooms, 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 similar rooms.

Δ *Category 2 Space (Category 2).* Space in which failure of equipment or a system is likely to cause minor injury to patients, staff, or visitors. [**99:**3.3.145.2] (517) (CMP-15)

Informational Note: These spaces were formerly known as general care rooms. Examples include, but are not limited to,

inpatient bedrooms, dialysis rooms, in vitro fertilization rooms, procedural rooms, and similar rooms.

Δ *Category 3 Space (Category 3).* Space in which the failure of equipment or a system is not likely to cause injury to patients, staff, or visitors but can cause discomfort. [**99:**3.3.145.3] (517) (CMP-15)

Informational Note: These spaces, formerly known as basic care rooms, 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.

Δ *Category 4 Space (Category 4).* Space in which failure of equipment or a system is not likely to have a physical impact on patient care. [**99:**3.3.145.4] (517) (CMP-15)

Informational Note: These spaces were formerly known as support rooms. Examples of support spaces include, but are not limited to, anesthesia work rooms, sterile supply, laboratories, morgues, waiting rooms, utility rooms, and lounges.

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 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:**3.3.146] (517) (CMP-15)

Patient Equipment Grounding Point. A jack or terminal that serves as the collection point for redundant grounding of electric appliances serving a patient care vicinity or for grounding other items in order to eliminate electromagnetic interference problems. [**99:**3.3.147] (517) (CMP-15)

Performance Area. The stage and audience seating area associated with a temporary stage structure, whether indoors or outdoors, constructed of scaffolding, truss, platforms, or similar devices, that is used for the presentation of theatrical or musical productions or for public presentations. (520) (CMP-15)

Permanent Amusement Attraction. A ride device, entertainment device, or a combination of both that is installed such that portability or relocation is impracticable. (522) (CMP-15)

Permanently Installed Decorative Fountains and Reflection Pools. Those that are constructed in the ground, on the ground, or in a building in such a manner that the fountain cannot be readily disassembled for storage, whether or not served by electrical circuits of any nature. These units are primarily constructed for their aesthetic value and are not intended for swimming or wading. (680) (CMP-17)

Personnel Protection System (as applied to EVSE). A system of personnel protection devices and constructional features that when used together provide protection against electric shock of personnel. (625) (CMP-12)

Phase, Manufactured. (Manufactured Phase) The phase that originates at the phase converter and is not solidly connected to either of the single-phase input conductors. (CMP-13)

Phase Converter. An electrical device that converts single-phase power to 3-phase electric power. (CMP-13)

Informational Note: Phase converters have characteristics that modify the starting torque and locked-rotor current of motors served, and consideration is required in selecting a phase converter for a specific load.

Phase Converter, Rotary. (Rotary-Phase Converter) A device that consists of a rotary transformer and capacitor panel(s) that permits the operation of 3-phase loads from a single-phase supply. (455) (CMP-13)

Phase Converter, Static. (Static-Phase Converter) A device without rotating parts, sized for a given 3-phase load to permit operation from a single-phase supply. (455) (CMP-13)

Photovoltaic Cell (PV). (Solar Cell). The basic photovoltaic device that generates dc electricity when exposed to light. (CMP-4)

Pier. A structure extending over the water and supported on a fixed foundation (fixed pier), or on flotation (floating pier), that provides access to the water. [**303:**3.3.18] (CMP-7)

Pier, Fixed. (Fixed Pier) Pier constructed on a permanent, fixed foundation, such as on piles, that permanently establishes the elevation of the structure deck with respect to land. [**303:**3.3.18.2] (CMP-7)

Pier, Floating. (Floating Pier) Pier designed with inherent flotation capability that allows the structure to float on the water surface and rise and fall with water level changes. [**303:**3.3.18.3] (CMP-7)

N **Pinout Configuration.** The assignment of electrical functions to connector pins in a multicircuit connector. (CMP-15)

Pipeline. A length of pipe including pumps, valves, flanges, control devices, strainers, and/or similar equipment for conveying fluids. (CMP-17)

N **Platform, Portable (as applied to equipment over 1000 volts ac or 1500 volts dc). (Portable Platform)** A means of providing access to equipment that is capable of being relocated if required and provides access for the task(s) to be performed on that equipment. (CMP-9)

Informational Note: See NFPA 70E, *Standard for Electrical Safety in the Workplace*, and OSHA 1926.955, *Portable Ladders and Platforms*, for safety information.

Plenum. A compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system. (CMP-3)

Plenum Cable, Cable Routing Assemblies, and Raceways. Cables, cable routing assemblies, and raceways that have adequate fire-resistant and low smoke-producing characteristics and are suitable for use in ducts, plenums, and other spaces used for environmental air. (722) (CMP-3)

Δ **Point of Entrance.** The point within a building at which a wire or cable emerges from an external wall, the roof, or the floor. (800) (CMP-16)

Δ **Pool.** Manufactured or field-constructed equipment designed to contain water and intended for use by persons for swimming, wading, immersion, recreational, or therapeutic purposes. (680) (CMP-17)

Informational Note No. 1: A leisure river attraction is a type of pool.

Informational Note No. 2: Bodies of water incorporated as part of an industrial process, lakes, lagoons, surf parks, or other natural and artificially made bodies of water that could incorporate swimming and swimming areas are not pools. Natural and artificially made bodies of water, which includes lakes, lagoons, surf

parks, or other similar bodies of water, are addressed in Article 682.

Pool, Immersion. (Immersion Pool) A pool for ceremonial or ritual immersion of users, which is designed and intended to have its contents drained or discharged. (680) (CMP-17)

Δ **Pool, Permanently Installed. (Permanently Installed Pools)** A pool that is permanently constructed or installed in the ground, partially in the ground, above ground, inside of a building, or on a building, whether or not served by electrical circuits. (680) (CMP-17)

Δ **Pool, Storable. (Storable Immersion Pool) (Storable Pool)** Pools of any water depth, used for swimming, wading, or immersion, installed entirely on or above the ground that are intended to be stored when not in use or are designed for ease of relocation. (680) (CMP-17)

Pool Cover, Electrically Operated. (Electrically Operated Pool Cover) Motor-driven equipment designed to cover and uncover the water surface of a pool by means of a flexible sheet or rigid frame. (680) (CMP-17)

Pool Lift, Electrically Powered. (Electrically Powered Pool Lift) An electrically powered lift that provides accessibility for people with disabilities to and from a pool or spa. (680) (CMP-17)

Δ **Portable.** A device intended for indoor or outdoor use that is designed to be hand-carried from location to location or easily transported without the use of other devices or equipment. (625) (CMP-12)

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N **Portable.** X-ray equipment designed to be hand-carried. (660) (CMP-12)

Portable (as applied to equipment). Equipment that is actually moved or can easily be moved from one place to another in normal use. (680) (CMP-17)

N **Portable Handlamp.** A cord- and plug-connected luminaire with a handle, and a hook for temporary mounting and hands-free operation. (CMP-18)

Portable Power Distribution Unit. A power distribution box containing receptacles and overcurrent protective devices (OCPDs). (520) (CMP-15)

Informational Note: See ANSI/UL 1640, *Portable Power-Distribution Equipment*, for information on portable power distribution units.

Portable Structures. Units designed to be moved including, but not limited to, amusement rides, attractions, concessions, tents, trailers, trucks, and similar units. (525) (CMP-15)

Portable Substation. A portable assembly, usually mounted on a trailer, containing primary and secondary switchgear and a transformer. (530) (CMP-15)

Powder Filling "q". Type of protection where electrical parts capable of igniting an explosive atmosphere are fixed in position and completely surrounded by filling material (glass or quartz powder) to prevent the ignition of an external explosive atmosphere. (CMP-14)

Informational Note: See ANSI/UL 60079-5, *Explosive Atmospheres — Part 5: Equipment protection by powder filling "q"*, for additional information.

N **Power Control System (PCS).** Equipment that monitors and controls power within a system to prevent overload of an electrical service, conductor, or power distribution equipment. (CMP-13)

N *Power Control System, Multisource. (Multisource Power Control System) (Multisource PCS)* A type of PCS with capability to control power production sources, with or without load management. (CMP-13)

N *Power Control System, Single-Source. (Single-Source Power Control System) (Single-Source PCS)* A type of PCS with capability for load management only. (CMP-13)

Power Outlet. An enclosed assembly that may include receptacles, circuit breakers, fuseholders, fused switches, buses, and watt-hour meter mounting means; intended to supply and control power to mobile homes, recreational vehicles, park trailers, or boats or to serve as a means for distributing power required to operate mobile or temporarily installed equipment. (CMP-7)

Power Outlet, Marina. (Marina Power Outlet) An enclosed assembly that can include equipment such as receptacles, circuit breakers, fused switches, fuses, watt-hour meters, panelboards, and monitoring means identified for marina use. (555) (CMP-7)

Power Production Source (Power Source). Electrical power production equipment other than a utility service, up to the source system disconnecting means. (CMP-4)

Informational Note: Examples of power production sources include engine and wind generators, solar photovoltaic systems, fuel cells, and energy storage systems.

Power Source Output Conductors. The conductors between power production equipment and the service or other premises wiring. (CMP-4)

N **Power Sources.** A system of one or more off-site or one or more on-site power generation or storage components intended to provide power to nonessential electrical loads and the essential electrical system. [**99:**3.3.155] (517) (CMP-15)

Power Supply. A Class 2 power supply connected between the branch-circuit power distribution system and the busbar of the low-voltage suspended ceiling power distribution system. (393) (CMP-18)

Power-Supply Cord. An assembly consisting of an attachment plug and a length of flexible cord connected to utilization equipment. (CMP-6)

Premises. The land and buildings located on the user's side of the point of demarcation between the communications service provider and the user. (800) (CMP-16)

Premises-Powered. Using power provided locally from the premises. (CMP-16)

Δ **Premises Wiring (System).** Interior and exterior wiring, including power, lighting, control, and signal circuit wiring together with all their associated hardware, fittings, and wiring devices, both permanently and temporarily installed. This includes one of the following:

(1) Wiring from the service point to the outlets
(2) Wiring from and including the power source to the outlets if there is no service point

Such wiring does not include wiring internal to appliances, luminaires, motors, controllers, motor control centers, and similar equipment. (CMP-1)

Informational Note: Power sources include, but are not limited to, interconnected or stand-alone batteries, solar photovoltaic systems, other distributed generation systems, or generators.

Pressurized. The process of supplying an enclosure with a protective gas with or without continuous flow at sufficient pressure to prevent the entrance of combustible dust or ignitible fibers/flyings. (CMP-14)

Pressurized Enclosure "p". Type of protection for electrical equipment that uses the technique of guarding against the ingress of the external atmosphere, which might be explosive, into an enclosure by maintaining a protective gas therein at a pressure above that of the external atmosphere. (CMP-14)

Informational Note: See ANSI/UL-60079-2, *Explosive Atmospheres — Part 2: Equipment protection by pressurized enclosures "p"*, for additional information.

Pressurized Room "p". A room volume protected by pressurization and of sufficient size to permit the entry of a person who might occupy the room. (CMP-14)

Informational Note: See ANSI/UL 60079-13, *Explosive Atmospheres — Part 13: Equipment protection by pressurized room "p" and artificially ventilated room "v"*, for information on the requirements for rooms intended for human entry where pressurization is used as a means of reducing the risk of explosion.

Primary Pad. A device external to the EV that transfers power via the contactless coupling as part of a wireless power transfer system. (625) (CMP-12)

Primary Source. An electric utility or another source of power that acts as the main forming and stabilizing source in an electric power system. (CMP-4)

Prime Mover. The machine that supplies the mechanical horsepower to a generator. (CMP-13)

Process Seal. A seal between electrical systems and flammable or combustible process fluids where a failure could allow the migration of process fluids into the premises' wiring system. (CMP-14)

Informational Note: See ANSI/UL 122701, *Requirements for Process Sealing Between Electrical Systems and Flammable or Combustible Process Fluids*, for additional information.

Production Areas. Areas where portable electrical equipment is used to implement the capture of images. (530) (CMP-15)

Projector, Nonprofessional. (Nonprofessional Projector) Those types of projectors that do not comply with the definition of *Professional-Type Projector*. (540) (CMP-15)

Projector, Professional-Type. (Professional-Type Projector) A type of projector using 35- or 70-mm film that has a minimum width of 35 mm (1⅜ in.) and has on each edge 212 perforations per meter (5.4 perforations per inch), or a type using carbon arc, xenon, or other light source equipment that develops hazardous gases, dust, or radiation. (540) (CMP-15)

Proscenium. The wall and arch that separates the stage from the auditorium (i.e., house). (520) (CMP-15)

Protection by Enclosure "t". Type of protection for explosive dust atmospheres where electrical equipment is provided with an enclosure providing dust ingress protection and a means to limit surface temperatures. (CMP-14)

Informational Note: See ANSI/UL 60079-31, *Explosive Atmospheres — Part 31: Equipment Dust Ignition Protection by Enclosure "t"*, for additional information.

Psychiatric Hospital. A building used exclusively for the psychiatric care, on a 24-hour basis, of four or more inpatients. (517) (CMP-15)

Purged and Pressurized. The process of (1) purging, supplying an enclosure with a protective gas at a sufficient flow and positive pressure to reduce the concentration of any flammable gas or vapor initially present to an acceptable level; and (2) pressurization, supplying an enclosure with a protective gas with or without continuous flow at sufficient pressure to prevent the entrance of a flammable gas or vapor, a combustible dust, or an ignitible fiber. (CMP-14)

Informational Note: See NFPA 496, *Standard for Purged and Pressurized Enclosures for Electrical Equipment*, for additional information.

Purpose-Built. A custom luminaire, a piece of lighting equipment, or an effect that is constructed for a specific purpose and is not serially manufactured or available for general sale. (530) (CMP-15)

PV dc Circuit (PV System dc Circuit). Any dc conductor in PV source circuits, PV string circuits, and PV dc-to-dc converter circuits. (690) (CMP-4)

PV dc Circuit, Source. (PV Source Circuit) The PV dc circuit conductors between modules in a PV string circuit, and from PV string circuits or dc combiners, to dc combiners, electronic power converters, or a dc PV system disconnecting means. (690) (CMP-4)

PV dc Circuit, String. (PV String Circuit) The PV source circuit conductors of one or more series-connected PV modules. (690) (CMP-4)

Δ **PV Module (Module) (Solar PV Module).** A complete unit consisting of solar cells and other components designed to produce dc power. (CMP-4)

PV (Photovoltaic) System (PV System) (Photovoltaic System). The total components, circuits, and equipment up to and including the PV system disconnecting means that, in combination, convert solar energy into electric energy. (CMP-4)

Δ **Qualified Person.** One who has skills and knowledge related to the construction, operation, and installation of electrical equipment and has received safety training to recognize and avoid the hazards involved. (CMP-1)

Informational Note: See NFPA *70E, Standard for Electrical Safety in the Workplace*, for electrical safety training requirements.

Raceway. An enclosed channel designed expressly for holding wires, cables, or busbars, with additional functions as permitted in this code. (CMP-8)

Raceway Cell. A single enclosed tubular space in a cellular metal or concrete floor member, the axis of the cell being parallel to the axis of the floor member. (CMP-8)

Raceway, Cellular Metal Floor. (Cellular Metal Floor Raceway) The hollow spaces of cellular metal floors, together with suita-

ble fittings, that may be approved as enclosed channel for electrical conductors. (CMP-8)

Δ **Raceway, Communications. (Communications Raceway)** An enclosed channel of nonmetallic materials designed expressly for holding communications wires and plenum, riser, and general-purpose limited-energy cables. (CMP-3)

Raceway, Strut-Type Channel. (Strut-Type Channel Raceway) A metal raceway that is intended to be mounted to the surface of or suspended from a structure, with associated accessories for the installation of electrical conductors and cables. (CMP-8)

Raceway, Surface Metal. (Surface Metal Raceway) A metal raceway that is intended to be mounted to the surface of a structure, with associated couplings, connectors, boxes, and fittings for the installation of electrical conductors. (CMP-8)

Raceway, Surface Nonmetallic. (Surface Nonmetallic Raceway) A nonmetallic raceway that is intended to be mounted to the surface of a structure, with associated couplings, connectors, boxes, and fittings for the installation of electrical conductors. (CMP-8)

Raceway, Underfloor. (Underfloor Raceway) A raceway and associated components designed and intended for installation beneath or flush with the surface of a floor for the installation of cables and electrical conductors. (CMP-8)

Rail. The structural support for the suspended ceiling system typically forming the ceiling grid supporting the ceiling tile and listed utilization equipment, such as sensors, actuators, A/V devices, and low-voltage luminaires and similar electrical equipment. (393) (CMP-18)

Rainproof. Constructed, protected, or treated so as to prevent rain from interfering with the successful operation of the apparatus under specified test conditions. (CMP-1)

Raintight. Constructed or protected so that exposure to a beating rain will not result in the entrance of water under specified test conditions. (CMP-1)

Rated-Load Current (RLC). The current of a hermetic refrigerant motor-compressor resulting when it is operated at the rated load, rated voltage, and rated frequency of the equipment it serves. (440) (CMP-11)

Rated Output Power. The amplifier manufacturer's stated or marked output power capability into its rated load. (640) (CMP-12)

Rated Power. The output power of a wind turbine at its rated wind speed. (694) (CMP-4)

Informational Note: See IEC 61400-12-1, *Power Performance Measurements of Electricity Producing Wind Turbines*, for the method for measuring wind turbine power output.

Receptacle. A contact device installed at the outlet for the connection of an attachment plug, or for the direct connection of electrical utilization equipment designed to mate with the corresponding contact device. A single receptacle is a single contact device with no other contact device on the same yoke or strap. A multiple receptacle is two or more contact devices on the same yoke or strap. (CMP-18)

Informational Note: A duplex receptacle is an example of a multiple receptacle that has two receptacles on the same yoke or strap.

N **Receptacle, Weather-Resistant (WR). (Weather-Resistant Receptacle)** A receptacle constructed to be resistant to the adverse effects of damp, wet, or outdoor locations. (CMP-18)

Receptacle, Weight-Supporting Ceiling (WSCR). (Weight-Supporting Ceiling Receptacle) A contact device installed at an outlet box for the connection and support of luminaries or ceiling-suspended (paddle) fans using a weight-supporting attachment fitting (WSAF). (CMP-18)

Informational Note: See ANSI/NEMA WD 6, *American National Standard for Wiring Devices — Dimensional Specifications*, for the standard configuration of weight-supporting ceiling receptacles and related weight-supporting attachment fittings.

Δ **Receptacle Outlet.** An outlet where the branch-circuit conductors are connected to one or more receptacles. (CMP-18)

Reconditioned Equipment. Electromechanical systems, equipment, apparatus, or components that are restored to operating conditions. This process differs from normal servicing of equipment that remains within a facility, or replacement of listed equipment on a one-to-one basis. (CMP-1)

Informational Note: The term *reconditioned* is frequently referred to as *rebuilt*, *refurbished*, or *remanufactured*.

Recreational Vehicle (RV) (Camping Trailer) (Motor Home) (Travel Trailer) (Truck Camper). A vehicle or slide-in camper that is primarily designed as temporary living quarters for recreational, camping, or seasonal use; has its own motive power or is mounted on or towed by another vehicle; is regulated by the National Highway Traffic Safety Administration as a vehicle or vehicle equipment; does not require a special highway use permit for operation on the highways; and can be easily transported and set up on a daily basis by an individual. [**1192:**3.3.52] (551) (CMP-7)

Informational Note: See NFPA 1192, *Standard on Recreational Vehicles*, Informative Annex A, for product types and definitions for motor homes and towable recreational vehicles.

Recreational Vehicle Park. Any parcel or tract of land under the control of any person, organization, or governmental entity wherein two or more recreational vehicle, recreational park trailer, and/or other camping sites are offered for use by the public or members of an organization for overnight stays. (551) (CMP-7)

Recreational Vehicle Site. A specific area within a recreational vehicle park or campground that is set aside for use by a camping unit. (551) (CMP-7)

Recreational Vehicle Site Supply Equipment. A power outlet assembly located near the point of entrance of supply conductors to a recreational vehicle site and intended to constitute the disconnecting means for connected recreational vehicles. (551) (CMP-7)

Recreational Vehicle Stand. That area of a recreational vehicle site intended for the placement of a recreational vehicle. (551) (CMP-7)

Reference Grounding Point. The ground bus of the panelboard or isolated power system panel supplying the patient care room. [**99:**3.3.165] (517) (CMP-15)

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). (517) (CMP-15)

Relay, Automatic Load Control (ALCR). (Automatic Load Control Relay) An emergency lighting control device used to set normally dimmed or normally-off switched emergency lighting equipment to full power illumination levels in the event of a loss of the normal supply by bypassing the dimming/switching controls, and to return the emergency lighting equipment to normal status when the device senses the normal supply has been restored. (700) (CMP-13)

Informational Note: See ANSI/UL 924, *Emergency Lighting and Power Equipment*, for the requirements covering automatic load control relays.

Remote-Control Circuit. Any electrical circuit that controls any other circuit through a relay or an equivalent device. (CMP-3)

Δ **Remote Disconnect Control.** An electric device and circuit that controls a disconnecting means through a relay or equivalent device. (CMP-1)

Resistance Heating Element. A specific separate element to generate heat that is stand-alone, externally attached to, embedded in, integrated with, or internal to the object to be heated. (CMP-17)

Informational Note: Tubular heaters, strip heaters, heating cable, heating tape, heating blankets, immersion heaters, and heating panels are examples of resistance heaters.

Restricted Industrial Establishment [as applied to hazardous (classified) locations]. Establishment with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation. (CMP-14)

Retrofit Kit. A complete subassembly of parts and devices for field conversion of utilization equipment. (CMP-18)

Retrofit Kit, General Use. (General Use Retrofit Kit) A kit that includes some, but not all, of the necessary parts to replace the illumination system of a host sign and installation instructions that identify the parts required to complete the subassembly in the field. (600) (CMP-18)

Retrofit Kit, Sign Specific. (Sign Specific Retrofit Kit) A kit that includes all of the necessary parts and hardware to allow for field installation in a host sign, based on the included installation instructions. (600) (CMP-18)

Reverse Polarity Protection (Backfeed Protection). A system that prevents two interconnected power supplies, connected positive to negative, from passing current from one power source into a second power source. (393) (CMP-18)

Ride Device. A device or combination of devices that carry, convey, or direct a person(s) over or through a fixed or restricted course within a defined area for the primary purpose of amusement or entertainment. (522) (CMP-15)

Riser Cable, Cable Routing Assemblies, and Raceways. Cables, cable routing assemblies, and raceways that have fire-resistant characteristics capable of preventing the carrying of fire from floor to floor and are suitable for use in a vertical run in a shaft or from floor to floor. (722) (CMP-3)

N **Road Show Connection Panel.** A type of panel designed to allow for road show connection of portable stage switchboards to fixed lighting outlets by means of permanently installed supplementary circuits. (520) (CMP-15)

Safe Zone. Low probability of damage other than a slight swelling of the capacitor case, as identified by the case rupture curve of the capacitor. (460) (CMP-11)

Δ **Safety Circuit.** The part of a control system containing one or more devices that perform a safety-related function. [**79:**3.3.96] (CMP-12)

Informational Note: See NFPA 79, *Electrical Standard for Industrial Machinery. Safety-related control system* and *safety interlock circuit* are common terms that can be used to refer to the safety circuit in other standards. The safety circuit can include hard-wired, communication, and software-related components.

Sealable Equipment. Equipment enclosed in a case or cabinet that is provided with a means of sealing or locking so that live parts cannot be made accessible without opening the enclosure. (CMP-1)

Informational Note: The equipment may or may not be operable without opening the enclosure.

Sealed [as applied to hazardous (classified) locations]. Constructed such that equipment is sealed effectively against entry of an external atmosphere and is not opened during normal operation or for any maintenance activities. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

Sealed, Hermetically. (Hermetically Sealed) Sealed against the entrance of an external atmosphere, such that the seal is made by fusion of metal to metal, ceramic to metal, or glass to metal. (CMP-14)

Informational Note: See ANSI/UL 121201, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*, for additional information.

Section Sign. A sign or outline lighting system, shipped as subassemblies, that requires field-installed wiring between the subassemblies to complete the overall sign. The subassemblies are either physically joined to form a single sign unit or are installed as separate remote parts of an overall sign. (600) (CMP-18)

Selected Receptacles. A minimal number of receptacles selected by the health care facility's governing body as necessary to provide essential patient care and facility services during loss of normal power. [**99:**3.3.171] (517) (CMP-15)

Self-Contained Therapeutic Tubs or Hydrotherapeutic Tanks. A factory-fabricated unit consisting of a therapeutic tub or hydrotherapeutic tank with all water-circulating, heating, and control equipment integral to the unit. Equipment may include pumps, air blowers, heaters, light controls, sanitizer generators, and so forth. (680) (CMP-17)

Separable Power Supply Cable Assembly. A flexible cord or cable, including ungrounded, grounded, and equipment grounding conductors, provided with a cord connector, an attachment plug, and all other fittings, grommets, or devices installed for the purpose of delivering energy from the source of electrical supply to the truck or transport refrigerated unit (TRU) flanged surface inlet. (626) (CMP-12)

Separately Derived System. An electrical power supply output, other than a service, having no direct connection(s) to circuit

conductors of any other electrical source other than those established by grounding and bonding connections. (CMP-5)

Service. The conductors and equipment connecting the serving utility to the wiring system of the premises served. (CMP-10)

Service Conductors. The conductors from the service point to the service disconnecting means. (CMP-10)

Service Conductors, Overhead. (Overhead Service Conductors) The overhead conductors between the service point and the first point of connection to the service-entrance conductors at the building or other structure. (CMP-10)

Service Conductors, Underground. (Underground Service Conductors) The underground conductors between the service point and the first point of connection to the service-entrance conductors in a terminal box, meter, or other enclosure, inside or outside the building wall. (CMP-10)

Informational Note: Where there is no terminal box, meter, or other enclosure, the point of connection is considered to be the point of entrance of the service conductors into the building.

Service Drop. The overhead conductors between the serving utility and the service point. (CMP-10)

Service-Entrance Conductor Assembly. Multiple single-insulated conductors twisted together without an overall covering, other than an optional binder intended only to keep the conductors together. (CMP-6)

Service-Entrance Conductors. The service conductors between the terminals of the service equipment to the service drop, overhead service conductors, service lateral, or underground service conductors. (CMP-10)

Informational Note: Where service equipment is located outside the building walls, there could be no service-entrance conductors or they might be entirely outside the building.

Service Equipment. The necessary equipment, consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the serving utility and intended to constitute the main control and disconnect of the serving utility. (CMP-10)

Service Equipment, Mobile Home. (Mobile Home Service Equipment) The equipment containing the disconnecting means, overcurrent protective devices (OCPDs), and receptacles or other means for connecting a mobile home feeder assembly. (550) (CMP-7)

Service Lateral. The underground conductors between the utility electric supply system and the service point. (CMP-10)

Service Point. The point of connection between the facilities of the serving utility and the premises wiring. (CMP-10)

Informational Note: The service point can be described as the point of demarcation between where the serving utility ends and the premises wiring begins. The serving utility generally specifies the location of the service point based on the conditions of service.

N **Service Point, Communications. (Communications Service Point)** The point of connection between the communications service provider's network (outside plant) and the premises wiring (inside plant). (CMP-16)

Servicing. The process of following a manufacturer's set of instructions or applicable industry standards to analyze, adjust, or perform prescribed actions upon equipment with the intention to preserve or restore the operational performance of the equipment. (CMP-1)

Informational Note: Servicing often encompasses maintenance and repair activities.

Shore Power. The electrical equipment required to power a floating vessel including, but not limited to, the receptacle and cords. (555) (CMP-7)

Shoreline. The farthest extent of standing water under the applicable conditions that determine the electrical datum plane for the specified body of water. (682) (CMP-7)

Short Circuit. An abnormal connection (including an arc) of relatively low impedance, whether made accidentally or intentionally, between two or more points of different potential. (CMP-10)

Short-Circuit Current Rating. The prospective symmetrical fault current at a nominal voltage to which equipment is able to be connected without sustaining damage exceeding defined acceptance criteria. (CMP-10)

Show Window. Any window, including windows above doors, used or designed to be used for the display of goods or advertising material, whether it is fully or partly enclosed or entirely open at the rear and whether or not it has a platform raised higher than the street floor level. (CMP-2)

Sign, Electric. (Electric Sign) Electrically operated utilization equipment with words, symbols, art, or advertising designed to convey information or attract attention. (CMP-18)

Δ **Sign, Host. (Host Sign)** A sign or outline lighting system already installed in the field that is designated by a retrofit kit for field conversion of the illumination system. (600) (CMP-18)

Sign, Photovoltaic (PV) Powered (PV Powered Sign). [Photovoltaic (PV) Powered Sign] A complete sign powered by solar energy consisting of all components and subassemblies for installation either as an off-grid stand-alone, on-grid interactive, or non-grid interactive system. (600) (CMP-18)

Sign Body. A portion of a sign that can provide protection from the weather and can additionally serve as an electrical enclosure. (600) (CMP-18)

Signaling Circuit. Any electrical circuit that energizes signaling equipment. (CMP-3)

Simple Apparatus. An electrical component or combination of components of simple construction with well-defined electrical parameters that does not generate more than 1.5 volts, 100 mA, and 25 mW, or a passive component that does not dissipate more than 1.3 watts and is compatible with the intrinsic safety of the circuit in which it is used. (CMP-14)

Informational Note No. 1: The following are examples of simple apparatus:

(1) Passive components; for example, switches, instrument connectors, plugs and sockets, junction boxes, resistance temperature devices, and simple semiconductor devices such as LEDs
(2) Sources of stored energy consisting of single components in simple circuits with well-defined parameters; for example, capacitors or inductors, whose values are considered when determining the overall safety of the system

(3) Sources of generated energy; for example, thermocouples and photocells, that do not generate more than 1.5 volts, 100 mA, and 25 mW

Informational Note No. 2: See ANSI/UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*, and ANSI/UL 60079-11, *Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety "i"*, for additional information.

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-18)

Site-Isolating Device. A pole-mounted disconnecting means installed at the distribution point for the purposes of isolation, system maintenance, emergency disconnection, or connection of optional standby systems. (547) (CMP-7)

Skeleton Tubing. Neon tubing that is itself the sign or outline lighting and is not attached to an enclosure or sign body. (600) (CMP-18)

Slip. A berthing space between or adjacent to piers, wharves, or docks; the water areas associated with boat occupation. [**303:**3.3.21] (555) (CMP-7)

Informational Note: See the definition of *Berth* for additional information.

Solid-State Phase-Control Dimmer. A solid-state dimmer where the wave shape of the steady-state current does not follow the wave shape of the applied voltage such that the wave shape is nonlinear. (CMP-15)

Solid-State Sine Wave Dimmer. A solid-state dimmer where the wave shape of the steady-state current follows the wave shape of the applied voltage such that the wave shape is linear. (CMP-15)

Spa or Hot Tub. A hydromassage pool, or tub for recreational or therapeutic use, not located in health care facilities, designed for immersion of users, and usually having a filter, heater, and motor-driven blower. It may be installed indoors or outdoors, on the ground or supporting structure, or in the ground or supporting structure. Generally, they are not designed or intended to have its contents drained or discharged after each use. (680) (CMP-17)

Spa or Hot Tub, Packaged Equipment Assembly. (Packaged Spa or Hot Tub Equipment Assembly) A factory-fabricated unit consisting of water-circulating, heating, and control equipment mounted on a common base, intended to operate a spa or hot tub. Equipment can include pumps, air blowers, heaters, lights, controls, sanitizer generators, and so forth. (680) (CMP-17)

Spa or Hot Tub, Self-Contained. (Self-Contained Spa or Hot Tub) Factory-fabricated unit consisting of a spa or hot tub vessel with all water-circulating, heating, and control equipment integral to the unit. Equipment can include pumps, air blowers, heaters, lights, controls, sanitizer generators, and so forth. (680) (CMP-17)

Spa or Hot Tub, Storable. (Storable Spa or Hot Tub) Spas or hot tubs installed entirely on or above the ground that are intended to be stored when not in use and are designed for ease of relocation. (680) (CMP-17)

Space. A portion of the health care facility designated by the health care facility's governing body that serves a specific purpose. [**99:**3.3.179] (517) (CMP-15)

Special Permission. The written consent of the authority having jurisdiction. (CMP-1)

Special Protection "s". Type of protection that permits design, assessment, and testing of equipment that cannot be fully assessed within a recognized type of protection or combination of recognized types of protection because of functional or operational limitations, but that can be demonstrated to provide the necessary equipment protection level (EPL). (CMP-14)

Informational Note: See ANSI/UL 60079-33, *Explosive Atmospheres — Part 33: Equipment Protection by Special Protection "s"*, for additional information.

Special-Purpose Multicircuit Cable System. A portable branch-circuit distribution system consisting of one or more trunk cables and optional breakout assemblies or multicircuit outlet enclosures. (520) (CMP-15)

Spider (Cable Splicing Block). A device that contains busbars that are insulated from each other for the purpose of splicing or distributing power to portable cables and cords that are terminated with single-pole busbar connectors. (530) (CMP-15)

Spin Down. A shutdown condition of the FESS, where energy is being dissipated and the flywheel rotor is slowing down to a stop. (706) (CMP-13)

Informational Note: A complete stop of a flywheel rotor cannot occur instantaneously because of the high kinetic energy of the rotor, but rather occurs over time as a result of friction forces acting on the rotor.

Splash Pad. A fountain intended for recreational use by pedestrians and designed to contain no more than 25 mm (1 in.) of water depth. This definition does not include showers intended for hygienic rinsing prior to use of a pool, spa, or other water feature. (680) (CMP-17)

Δ **Spray Area.** Any fully enclosed, partly enclosed, or unenclosed area in which flammable or combustible vapors, mists, residues, dusts, or deposits are present due to the operation of spray processes, including:

(1) any area in the direct path of a spray application process;
(2) the interior of a spray booth, spray room, or limited finishing workstation, as herein defined;
(3) the interior of any exhaust plenum, eliminator section, or scrubber section;
(4) the interior of any exhaust duct or exhaust stack leading from a spray application process;
(5) the interior of any air recirculation path up to and including recirculation particulate filters;
(6) any solvent concentrator (pollution abatement) unit or solvent recovery (distillation) unit; and
(7) the inside of a membrane enclosure.

The following are not part of the spray area:

(1) fresh air make-up units;
(2) air supply ducts and air supply plenums;
(3) recirculation air supply ducts downstream of recirculation particulate filters; and
(4) exhaust ducts from solvent concentrator (pollution abatement) units. [**33:**3.3.2.3] (CMP-14)

Informational Note No. 1: Unenclosed spray areas are locations outside of buildings or are localized operations within a larger room or space. Such areas are normally provided with some local vapor extraction/ventilation system. In automated operations, the area limits are the maximum area in the direct path of spray operations. In manual operations, the area limits are the maximum area of spray when aimed at 90 degrees to the application surface.

Informational Note No. 2: See definitions for *limited finishing workstation* and *membrane enclosure* for additional information.

Spray Area, Outdoor. (Outdoor Spray Area) A spray area that is outside the confines of a building or that has a canopy or roof that does not limit the dissipation of the heat of a fire or dispersion of flammable vapors and does not restrict firefighting access and control. For the purpose of this standard, an outdoor spray area can be treated as an unenclosed spray area as defined in this code. [**33:**3.3.2.3.1] (CMP-14)

Spray Area, Unenclosed. (Unenclosed Spray Area) Any spray area that is not confined by a limited finishing workstation, spray booth, or spray room, as herein defined. [**33:**3.3.2.3.2] (CMP-14)

Spray Booth. A power-ventilated enclosure for a spray application operation or process that confines and limits the escape of the material being sprayed, including vapors, mists, dusts, and residues that are produced by the spraying operation and conducts or directs these materials to an exhaust system. [**33:**3.3.21] (CMP-14)

Informational Note: A spray booth is an enclosure or insert within a larger room used for spraying, coating, and/or dipping applications. A spray booth can be fully enclosed or have open front or face and can include a separate conveyor entrance and exit. The spray booth is provided with a dedicated ventilation exhaust with supply air from the larger room or from a dedicated air supply.

Δ **Spray Room.** A power-ventilated fully enclosed room with a specified fire resistance rating used for spraying of flammable or combustible materials. [**33:**3.3.22] (CMP-14)

Stage Effect (Special Effect). An electrical or electromechanical piece of equipment used to simulate a distinctive visual or audible effect, such as a wind machine, lightning simulator, or sunset projector. (CMP-15)

Stage Equipment. Equipment at any location on the premises integral to the stage production including, but not limited to, equipment for lighting, audio, special effects, rigging, motion control, projection, or video. (520) (CMP-15)

Stage Lighting Hoist. A motorized lifting device that contains a mounting position for one or more luminaires, with wiring devices for connection of luminaires to branch circuits, and integral flexible cables to allow the luminaires to travel over the lifting range of the hoist while energized. (520) (CMP-15)

Stage Property. An article or object used as a visual element in a motion picture or television production, except painted backgrounds (scenery) and costumes. (530) (CMP-15)

Stage Set. A specific area set up with temporary scenery and properties designed and arranged for a particular scene in a motion picture or television production. (CMP-15)

Stage Switchboard, Fixed. (Fixed Stage Switchboard) A permanently installed switchboard, panelboard, or rack containing dimmers or relays with associated overcurrent protective devices (OCPDs), or overcurrent protective devices (OCPDs) alone, used primarily to feed stage equipment. (CMP-15)

Stage Switchboard, Portable. (Portable Stage Switchboard) A portable rack or pack containing dimmers or relays with associated overcurrent protective devices (OCPDs), or overcurrent protective devices (OCPDs) alone, used to feed stage equipment. (520) (CMP-15)

Stand Lamp. A portable stand that contains a general-purpose luminaire or lampholder with guard for the purpose of providing general illumination on a stage, in an auditorium, or in a studio. (520) (CMP-15)

Stand-Alone System. A system that is not connected to an electric power production and distribution network. (CMP-4)

• **Storage, Dry Stack. (Dry Stack Storage)** A facility, either covered or uncovered, constructed of horizontal and vertical structural members designed to allow placement of small boats in defined slots arranged both horizontally and vertically. [**303:**3.3.24.2] (555) (CMP-7)

Stored-Energy Power Supply System (SEPSS). A complete functioning EPSS powered by a stored-energy electrical source. (CMP-13)

Stranding, Compact. (Compact Stranding) A conductor stranding method in which each layer of strands is pressed together to minimize the gaps between the strands so the overall diameter of the finished conductor is less than a concentric stranded conductor and less than a compressed stranded conductor. (CMP-6)

Stranding, Compressed. (Compressed Stranding) A conductor stranding method in which the outer layer of strands is pressed together so the overall diameter of the finished conductor is less than a concentric stranded conductor but greater than a compact stranded conductor. (CMP-6)

Stranding, Concentric. (Concentric Stranding) A conductor consisting of a straight central strand surrounded by one or more layers of strands, helically laid in a geometric pattern. (CMP-6)

Strip Light. A luminaire with multiple lamps arranged in a row. (520) (CMP-15)

Structure. That which is built or constructed, other than equipment. (CMP-1)

Structure, Relocatable. (Relocatable Structure) A factory-assembled structure or structures transportable in one or more sections that are built on a permanent chassis and designed to be used as other than a dwelling unit without a permanent foundation. (545) (CMP-7)

Informational Note: Examples of relocatable structures are those units that are equipped for sleeping purposes only, contractor's and other on-site offices, construction job dormitories, studio dressing rooms, banks, clinics, stores, shower facilities and restrooms, training centers, or for the display or demonstration of merchandise or machines.

Subassembly. Component parts or a segment of a sign, retrofit kit, or outline lighting system that, when assembled, forms a complete unit or product. (600) (CMP-18)

Substation. An assemblage of equipment (e.g., switches, interrupting devices, circuit breakers, buses, and transformers) through which electric energy is passed for the purpose of

distribution, switching, or modifying its characteristics. (CMP-9)

Supervisory Control and Data Acquisition (SCADA). An electronic system that provides monitoring and controls for the operation of the critical operations power system. (CMP-13)

Informational Note: This can include the fire alarm system, security system, control of the HVAC, the start/stop/monitoring of the power supplies and electrical distribution system, annunciation and communications equipment to emergency personnel, facility occupants, and remote operators.

Support Areas. Areas, other than fixed production offices, intended to support production and where image capture will not take place. Such areas include, but are not limited to, mobile production offices, storage, and workspaces; vehicles and trailers for cast, makeup, hair, lighting, grip, wardrobe, props, catering, and craft services; and portable restrooms. (530) (CMP-15)

Surge Arrester. A protective device for limiting surge voltages by discharging or bypassing surge current; it also prevents continued flow of follow current while remaining capable of repeating these functions. (CMP-10)

Δ **Surge-Protective Device (SPD).** A protective device for limiting transient voltages by diverting or limiting surge current; it also prevents continued flow of follow current while remaining capable of repeating these functions and is designated as follows:

(1) Type 1: Permanently connected SPDs intended for installation between the secondary of the service transformer and the line side of the service disconnect overcurrent protective device (OCPD)
(2) Type 2: Permanently connected SPDs intended for installation on the load side of the service disconnect overcurrent protective device (OCPD), including SPDs located at the branch panel
(3) Type 3: Point of utilization SPDs
(4) Type 4: Component SPDs, including discrete components, as well as assemblies. (CMP-10)

Informational Note: See UL 1449, *Standard for Surge Protective Devices*, for further information on SPDs.

Suspended Ceiling Grid. A system that serves as a support for a finished ceiling surface and other utilization equipment. (393) (CMP-18)

N **Switch, Bypass Isolation. (Bypass Isolation Switch)** A manual, nonautomatic, or automatic device used in conjunction with a transfer switch to provide a means of bypass that directly connects the load conductors to a power source and allows the transfer switch to be isolated or disconnected. [**110:**3.3.17.2] (CMP-13)

Switch, General-Use. (General-Use Switch) A switch intended for use in general distribution and branch circuits. It is rated in amperes, and it is capable of interrupting its rated current at its rated voltage. (CMP-10)

Switch, General-Use Snap. (General-Use Snap Switch) A form of general-use switch constructed so that it can be installed in device boxes or on box covers, or otherwise used in conjunction with wiring systems recognized by this code. (CMP-18)

Switch, Isolating. (Isolating Switch) A switch intended for isolating an electrical circuit from the source of power. It has no interrupting rating, and it is intended to be operated only after the circuit has been opened by some other means. (CMP-10)

Switch, Motor-Circuit. (Motor-Circuit Switch) A switch rated in horsepower that is capable of interrupting the maximum operating overload current of a motor of the same horsepower rating as the switch at the rated voltage. (CMP-11)

Switchboard. A large single panel, frame, or assembly of panels on which are mounted on the face, back, or both, switches, overcurrent protective devices (OCPDs) and other protective devices, buses, and usually instruments. (CMP-10)

Informational Note: These assemblies can be accessible from the rear or side as well as from the front and are not intended to be installed in cabinets.

Switchgear. An assembly completely enclosed on all sides and top with sheet metal (except for ventilating openings and inspection windows) and containing primary power circuit switching, interrupting devices, or both, with buses and connections. The assembly may include control and auxiliary devices. Access to the interior of the enclosure is provided by doors, removable covers, or both. (CMP-10)

Informational Note: All switchgear subject to *NEC* requirements is metal enclosed. Switchgear rated below 1000 V or less may be identified as "low-voltage power circuit breaker switchgear." Switchgear rated over 1000 V may be identified as "metal-enclosed switchgear" or "metal-clad switchgear." Switchgear is available in non–arc-resistant or arc-resistant constructions.

Switching Device (as applied to equipment rated over 1000 volts ac, 1500 volts dc, nominal). A device designed to close, open, or both, one or more electrical circuits. (CMP-9)

Cutout. An assembly of a fuse support with either a fuseholder, fuse carrier, or disconnecting blade. The fuseholder or fuse carrier may include a conducting element (fuse link) or may act as the disconnecting blade by the inclusion of a nonfusible member. (CMP-9)

Disconnecting Switch (or Isolating Switch). A mechanical switching device used for isolating a circuit or equipment from a source of power. (CMP-9)

Interrupter Switch. A switching device capable of making, carrying, and interrupting specified currents. (CMP-9)

Oil-Filled Cutout. A cutout in which all or part of the fuse support and its fuse link or disconnecting blade is mounted in oil with complete immersion of the contacts and the fusible portion of the conducting element (fuse link) so that arc interruption by severing of the fuse link or by opening of the contacts will occur under oil. (CMP-9)

Oil Switch. A switching device having contacts that operate under oil (or askarel or other suitable liquid). (CMP-9)

Regulator Bypass Switch. A switching device or combination of switching devices designed to bypass equipment used to control voltage levels or related circuit characteristics. (CMP-9)

System Isolation Equipment. A redundantly monitored, remotely operated contactor-isolating system, packaged to provide the disconnection/isolation function, capable of verifiable operation from multiple remote locations by means of lockout switches, each having the capability of being padlocked in the "off" (open) position. (430) (CMP-11)

Δ **Tap Conductor.** A conductor, other than a service conductor, that has overcurrent protection ahead of its point of supply that exceeds the value permitted for similar conductors that are protected as described elsewhere in 240.4. (240) (CMP-10)

Task Illumination. Provisions for the minimum lighting required to carry out necessary tasks in the areas described in 517.34(A), including safe access to supplies and equipment and access to exits. [**99:**3.3.185] (517) (CMP-15)

Technical Power System. An electrical distribution system where the equipment grounding conductor is isolated from the premises grounded conductor and the premises equipment grounding conductor except at a single grounded termination point within a branch-circuit panelboard, at the originating (main breaker) branch-circuit panelboard or at the premises grounding electrode. (640) (CMP-12)

Temporary Equipment. Portable wiring and equipment intended for use with events of a transient or temporary nature where all equipment is presumed to be removed at the conclusion of the event. (640) (CMP-12)

Terminal (as applied to batteries). That part of a cell, container, or battery to which an external connection is made (commonly identified as post, pillar, pole, or terminal post). (CMP-13)

Thermal Protector (as applied to motors). A protective device for assembly as an integral part of a motor or motor-compressor that, when properly applied, protects the motor against dangerous overheating due to overload and failure to start. (CMP-11)

Informational Note: The thermal protector may consist of one or more sensing elements integral with the motor or motor-compressor and an external control device.

Thermal Resistivity. The heat transfer capability through a substance by conduction. (CMP-6)

Informational Note: Thermal resistivity is the reciprocal of thermal conductivity and is designated Rho, which is expressed in the units °C-cm/W.

Thermally Protected (as applied to motors). A motor or motor-compressor that is provided with a thermal protector. (CMP-11)

Top Shield. A grounded metal shield covering under-carpet components of the flat conductor cable (Type FCC) system for the purposes of providing protection against physical damage. (324) (CMP-6)

Tower. A pole or other structure that supports a wind turbine. (694) (CMP-4)

Transfer Switch. An automatic or nonautomatic device for transferring one or more load conductor connections from one power source to another. (CMP-13)

Transfer Switch, Branch-Circuit Emergency Lighting (BCELTS). (Branch-Circuit Emergency Lighting Transfer Switch) A device connected on the load side of a branch-circuit overcurrent protective device (OCPD) that transfers only emergency lighting loads from the normal power source to an emergency power source. (700) (CMP-13)

Informational Note: See ANSI/UL 1008, *Transfer Switch Equipment*, for information covering branch-circuit emergency lighting transfer switches.

Transfer Switch, Bypass Isolation. (Bypass Isolation Transfer Switch) Equipment that includes a transfer switch and bypass isolation functionality. (CMP-13)

Transfer Switch, Meter-Mounted. (Meter-Mounted Transfer Switch) A transfer switch connected between the utility meter and the meter base. (CMP-13)

Informational Note: Meter-mounted transfer switches can plug into the meter base. Transfer switches that incorporate the meter base in the transfer equipment assembly are not considered meter-mounted transfer switches.

Transformer. Equipment, either single-phase or polyphase, that uses electromagnetic induction to convert current and voltage in a primary circuit into current and voltage in a secondary circuit. (CMP-9)

N **Transformer Secondary Conductor.** A conductor, other than a service conductor, that originates at the secondary winding terminals of a transformer. (CMP-10)

Transition Assembly. An assembly to facilitate connection of the flat conductor cable (Type FCC) system to other wiring systems, incorporating (1) a means of electrical interconnection and (2) a suitable box or covering for providing electrical safety and protection against physical damage. (324) (CMP-6)

Transport Refrigerated Unit (TRU). A trailer or container, with integrated cooling or heating, or both, used for the purpose of maintaining the desired environment of temperature-sensitive goods or products. (626) (CMP-12)

Transportable. X-ray equipment that is to be installed in a vehicle or that may be readily disassembled for transport in a vehicle. (660) (CMP-12)

Truck. A motor vehicle designed for the transportation of goods, services, and equipment. (626) (CMP-12)

Truck Coupler. A truck flanged surface inlet and mating cord connector. (626) (CMP-12)

Truck Flanged Surface Inlet. The device(s) on the truck into which the connector(s) is inserted to provide electric energy and other services. This device is part of the truck coupler. The truck flanged surface inlet is considered to be part of the truck and not part of the electrified truck parking space supply equipment. (626) (CMP-12)

Trunk Cable. A portable extension cable containing six or more branch circuits, a male multipole plug, and a female multipole receptacle. (520) (CMP-15)

Tubing, Electrical Metallic (EMT). (Electrical Metallic Tubing) An unthreaded thinwall raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment grounding conductor when installed utilizing appropriate fittings. (CMP-8)

Tubing, Electrical Nonmetallic (ENT). (Electrical Nonmetallic Tubing) A nonmetallic, pliable, corrugated raceway of circular cross section with integral or associated couplings, connectors, and fittings for the installation of electrical conductors. It is composed of a material that is resistant to moisture and chemical atmospheres and is flame retardant.

A pliable raceway is a raceway that can be bent by hand with a reasonable force but without other assistance. (CMP-8)

Tubing, Flexible Metallic (FMT). (Flexible Metallic Tubing) A metal raceway that is circular in cross section, flexible, and liquidtight without a nonmetallic jacket. (CMP-8)

Twofer. An assembly containing one male plug and two female cord connectors used to connect two loads to one branch circuit. (520) (CMP-15)

Type of Protection "n". Type of protection where electrical equipment, in normal operation, is not capable of igniting a surrounding explosive gas atmosphere and a fault capable of causing ignition is not likely to occur. (CMP-14)

Informational Note: See ANSI/UL 60079-15, *Explosive Atmospheres — Part 15: Equipment Protection by Type of Protection "n"*, for additional information.

Ungrounded. Not connected to ground or to a conductive body that extends the ground connection. (CMP-5)

Uninterruptible Power Supply (UPS). A device or system that provides quality and continuity of ac power through the use of a stored-energy device as the backup power source for a period of time when the normal power supply is incapable of performing acceptably. (CMP-13)

Unit Equipment. A battery-equipped emergency luminaire that illuminates only as part of the emergency illumination system and is not illuminated when the normal supply is available. (CMP-13)

Utilization Equipment. Equipment that utilizes electric energy for electronic, electromechanical, chemical, heating, lighting, or similar purposes. (CMP-1)

Valve Actuator Motor (VAM) Assemblies. A manufactured assembly, used to operate a valve, consisting of an actuator motor and other components such as motor controllers, torque switches, limit switches, and overload protection. (430) (CMP-11)

Informational Note: VAMs typically have short-time duty and high-torque characteristics.

Ventilated. Provided with a means to permit circulation of air sufficient to remove an excess of heat, fumes, or vapors. (CMP-14)

Vessel. A container such as a barrel, drum, or tank for holding fluids or other material. (CMP-17)

Volatile Flammable Liquid. A flammable liquid having a flash point below 38°C (100°F), or a flammable liquid whose temperature is above its flash point, or a Class II combustible liquid that has a vapor pressure not exceeding 276 kPa (40 psia) at 38°C (100°F) and whose temperature is above its flash point. (CMP-14)

Voltage (of a circuit). The greatest root-mean-square (rms) (effective) difference of potential between any two conductors of the circuit concerned. (CMP-1)

Informational Note: Some systems, such as 3-phase 4-wire, single-phase 3-wire, and 3-wire direct current, may have various circuits of various voltages.

Voltage, High. (High Voltage) (High-Voltage) A potential difference over 1000 volts ac, 1500 volts dc, nominal. (CMP-9)

Informational Note: Circuits and equipment rated at potential differences of more than 1000 volts ac, 1500 volts dc, and up to 52 kV, are also commonly referred to as medium voltage.

Δ **Voltage, Low. (Low Voltage)** An electromotive force rated 24 volts, nominal, or less. (552) (CMP-7)

Voltage, Nominal. (Nominal Voltage) A nominal value assigned to a circuit or system for the purpose of conveniently designating its voltage class (e.g., 120/240 volts, 480Y/277 volts, 600 volts). (CMP-1)

Informational Note No. 1: The actual voltage at which a circuit operates can vary from the nominal within a range that permits satisfactory operation of equipment.

Informational Note No. 2: See ANSI C84.1-2011, *Voltage Ratings for Electric Power Systems and Equipment (60 Hz)*.

Voltage, Nominal (as applied to battery or cell).(Nominal Voltage) The value assigned to a cell or battery of a given voltage class for the purpose of convenient designation. The operating voltage of the cell or battery may vary above or below this value. (CMP-13)

Informational Note: The most common nominal cell voltages are 2 volts per cell for the lead-acid batteries, 1.2 volts per cell for alkali batteries, and 3.2 to 3.8 volts per cell for Li-ion batteries. Nominal voltages might vary with different chemistries.

Voltage to Ground. For grounded circuits, the voltage between the given conductor and that point or conductor of the circuit that is grounded; for ungrounded circuits, the greatest voltage between the given conductor and any other conductor of the circuit. (CMP-1)

Watertight. Constructed so that moisture will not enter the enclosure under specified test conditions. (CMP-1)

Weatherproof. Constructed or protected so that exposure to the weather will not interfere with successful operation. (CMP-1)

Informational Note: Rainproof, raintight, or watertight equipment can fulfill the requirements for weatherproof where varying weather conditions other than wetness, such as snow, ice, dust, or temperature extremes, are not a factor.

Wharf. A structure at the shoreline that has a platform built along and parallel to a body of water with either an open deck or a superstructure. [**307:**3.3.28] (555) (CMP-7)

Wind Turbine. A mechanical device that converts wind energy to electrical energy. (CMP-4)

Wind Turbine Output Circuit. (Turbine Output Circuit) The circuit conductors between the internal components of a wind turbine (which might include an alternator, integrated rectifier, controller, and/or inverter) and other equipment. (694) (CMP-4)

Δ **Wire (as applied to limited-energy systems).** A factory assembly of one or more insulated conductors without an overall covering. (CMP-3)

Wireless Power Transfer (WPT). The transfer of electrical energy from a power source to an electrical load via magnetic fields by a contactless means between a primary device and a secondary device. (625) (CMP-12)

Wireless Power Transfer Equipment (WPTE). Equipment installed specifically for the purpose of transferring energy between the premises wiring and the electric vehicle without physical electrical contact. (625) (CMP-12)

Informational Note No. 1: The general form of WPTE consists of two physical packages: a control box and a primary pad.

Informational Note No. 2: Electric vehicle power export equipment and wireless power transfer equipment are sometimes contained in one set of equipment, sometimes referred to as a bidirectional WPTE.

Wireways, Metal. (Metal Wireways) Sheet metal troughs with hinged or removable covers for housing and protecting electrical wires and cable and in which conductors are laid in place after the raceway has been installed as a complete system. (CMP-8)

Wireways, Nonmetallic. (Nonmetallic Wireways) Flame-retardant, nonmetallic troughs with removable covers for housing and protecting electrical wires and cables in which conductors are laid in place after the raceway has been installed as a complete system. (CMP-8)

N **Wiring Device.** An electrical device with a yoke or used with flexible cord or cable that serves as either a connection point to facilitate the flow of current or as a control device in general distribution and branch circuits. (CMP-18)

Informational Note: Examples of wiring devices include attachment plugs, receptacles, general-use snap switches, pendant switches, surface switches, dimmers, and electronic control switches and lighting control switches.

Work Surface. A fixed, stationary, or portable surface typically intended for dry use and for tasks other than food or beverage preparation, food or beverage serving, personal lavation, or laundering that presents an incidental risk of spillage of smaller quantities of beverages and other liquids upon outlets mounted directly on or recessed in the surface. (CMP-2)

Informational Note No. 1: See UL 111, *Outline of Investigation for Multioutlet Assemblies*, and UL 962A, *Furniture Power Distribution Units*, which establish the performance evaluation criteria and construction criteria.

Informational Note No. 2: See 406.14(F), 406.14(G)(1), and 406.14(H) for information on receptacles for work surfaces distinguished from receptacles for counters and countertops.

N **Yoke (Strap).** The structural frame of a wiring device, such as a receptacle or switch, that serves as the mounting means. (CMP-18)

Zone. A physically identifiable area (such as barriers or separation by distance) within an information technology equipment room, with dedicated power and cooling systems for the information technology equipment or systems. (645) (CMP-12)

ARTICLE 110
General Requirements for Electrical Installations

Part I. General

Δ **110.1 Scope.** This article covers general requirements for the examination and approval, installation and use, access to and spaces about electrical conductors and equipment; enclosures intended for personnel entry; and tunnel installations.

Δ **110.2 Approval.** The conductors and equipment required or permitted by this code shall be acceptable only if approved.

Informational Note No. 1: See 90.7, Examination of Equipment for Safety, and 110.3, Examination, Identification, Installation, Use, and Listing (Product Certification) of Equipment.

Informational Note No. 2: See Article 100 for the definitions of *Approved, Identified, Labeled,* and *Listed.*

110.3 Examination, Identification, Installation, Use, and Listing (Product Certification) of Equipment.

Δ **(A) Examination.** In judging equipment, considerations such as the following shall be evaluated:

(1) Suitability for installation and use in conformity with this code

Informational Note No. 1: Equipment may be new, reconditioned, refurbished, or remanufactured.

Informational Note No. 2: Suitability of equipment use may be identified by a description marked on or provided with a product to identify the suitability of the product for a specific purpose, environment, or application. Special conditions of use or other limitations and other pertinent information may be marked on the equipment, included in the product instructions, or included in the appropriate listing and labeling information. Suitability of equipment may be evidenced by listing or labeling.

(2) Mechanical strength and durability, including, for parts designed to enclose and protect other equipment, the adequacy of the protection thus provided
(3) Wire-bending and connection space
(4) Electrical insulation
(5) Heating effects under normal conditions of use and also under abnormal conditions likely to arise in service
(6) Arcing effects
(7) Classification by type, size, voltage, current capacity, and specific use
(8) Cybersecurity for network-connected life safety equipment to address its ability to withstand unauthorized updates and malicious attacks while continuing to perform its intended safety functionality

Informational Note No. 3: See the ANSI/ISA 62443 series of standards for industrial automation and control systems, the UL 2900 series of standards for software cybersecurity for network-connectable products, and UL 5500, *Standard for Remote Software Updates*, which are standards that provide frameworks to mitigate current and future security cybersecurity vulnerabilities and address software integrity in systems of electrical equipment.

Informational Note No. 4: See NEMA CY 70001, *Cybersecurity Implementation Guidance for Connected Electrical Infrastructure*, for recommendations on how to meet this requirement.

(9) Other factors that contribute to the practical safeguarding of persons using or likely to come in contact with the equipment

(B) Installation and Use. Equipment that is listed, labeled, or both, or identified for a use shall be installed and used in accordance with any instructions included in the listing, labeling, or identification. Such instructions shall result in an installation and use that complies with the requirements within this code.

Informational Note: The installation and use instructions may be provided in the form of printed material, quick response (QR) code, or the address on the internet where users can download the required instructions.

(C) Listing. Product testing, evaluation, and listing (product certification) shall be performed by recognized qualified electrical testing laboratories and shall be in accordance with applicable product standards recognized as achieving equivalent and effective safety for equipment installed to comply with this code.

Informational Note: The Occupational Safety and Health Administration (OSHA) recognizes qualified electrical testing laboratories that perform evaluations, testing, and certification of certain products to ensure that they meet the requirements of both the construction and general industry OSHA electrical standards. If the listing (product certification) is done under a qualified electrical testing laboratory program, this listing mark signifies that the tested and certified product complies with the requirements of one or more appropriate product safety test standards.

110.4 Voltages. The voltage considered shall be that at which the circuit operates. The voltage rating of electrical equipment shall not be less than the nominal voltage of a circuit to which it is connected.

110.5 Conductors. Conductors used to carry current shall be of copper, aluminum, or copper-clad aluminum unless otherwise provided in this code. If the conductor material is not specified, the sizes given in this code shall apply to copper conductors. If other materials are used, the size shall be changed accordingly.

110.6 Conductor Sizes. Conductor sizes are expressed in American Wire Gauge (AWG) or in circular mils.

110.7 Wiring Integrity. Completed wiring installations shall be free from short circuits, ground faults, or any connections to ground other than as required or permitted elsewhere in this code.

110.8 Wiring Methods. Only wiring methods recognized as suitable are included in this code. The recognized methods of wiring shall be permitted to be installed in any type of building, occupancy, or premises wiring system, except as otherwise provided in this code.

110.9 Interrupting Rating. Equipment intended to interrupt current at fault levels shall have an interrupting rating at nominal circuit voltage at least equal to the available fault current at the line terminals of the equipment.

Equipment intended to interrupt current at other than fault levels shall have an interrupting rating at nominal circuit voltage at least equal to the current that must be interrupted.

Δ **110.10 Available Fault Current, Short-Circuit Current Ratings, and Other Characteristics.** The OCPDs, equipment short-circuit current ratings, and other characteristics of the circuit to be protected shall be selected and coordinated with the available fault current to permit the circuit protective devices used to clear a fault to do so without extensive damage to the electrical equipment of the circuit. Listed equipment applied in accordance with their listing shall be considered to meet the requirements of this section.

Δ **110.11 Deteriorating Agents.** Unless identified for use in the operating environment, no conductors or equipment shall be located in damp or wet locations; where exposed to gases, fumes, vapors, liquids, or other agents that have a deteriorating effect on the conductors or equipment; or where exposed to excessive temperatures.

Informational Note No. 1: See 300.8 for protection against corrosion.

Informational Note No. 2: Some cleaning and lubricating compounds can cause severe deterioration of many plastic materials used for insulating and structural applications in equipment.

Equipment not identified for outdoor use and equipment identified only for indoor use, such as "dry locations," "indoor use only," "damp locations," or enclosure Types 1, 2, 5, 12, 12K, and/or 13, shall be protected against damage from the weather during construction.

Informational Note No. 3: See Table 110.28 for appropriate enclosure-type designations.

Informational Note No. 4: See *NFPA 5000, Building Construction and Safety Code*, the *International Building Code (IBC)*, and the *International Residential Code for One- and Two-Family Dwellings (IRC)*, for information for minimum flood provisions.

110.12 Mechanical Execution of Work. Electrical equipment shall be installed in a professional and skillful manner.

Informational Note: See ANSI/NECA 1-2023, *Standard for Good Workmanship in Electrical Construction,* and other ANSI-approved installation standards for information on accepted industry practices.

(A) Unused Openings. Unused openings, other than those intended for the operation of equipment, those intended for mounting purposes, or those permitted as part of the design for listed equipment, shall be closed to afford protection substantially equivalent to the wall of the equipment. Where metallic plugs or plates are used with nonmetallic enclosures, they shall be recessed at least 6 mm (¼ in.) from the outer surface of the enclosure.

(B) Integrity of Electrical Equipment and Connections. Internal parts of electrical equipment, including busbars, wiring terminals, insulators, and other surfaces, shall not be damaged or contaminated by foreign materials such as paint, plaster, cleaners, abrasives, or corrosive residues. There shall be no damaged parts that may adversely affect safe operation or mechanical strength of the equipment such as parts that are broken; bent; cut; or deteriorated by corrosion, chemical action, or overheating.

• **110.13 Mounting and Cooling of Equipment.**

(A) Mounting. Electrical equipment shall be firmly secured to the surface on which it is mounted. Wooden plugs driven into holes in masonry, concrete, plaster, or similar materials shall not be used.

(B) Cooling. Electrical equipment that depends on the natural circulation of air and convection principles for cooling of exposed surfaces shall be installed so that room airflow over such surfaces is not prevented by walls or by adjacent installed equipment. For equipment designed for floor mounting, clearance between top surfaces and adjacent surfaces shall be provided to dissipate rising warm air.

Electrical equipment provided with ventilating openings shall be installed so that walls or other obstructions do not prevent the free circulation of air through the equipment.

Δ **110.14 Electrical Connections.** Termination devices such as pressure terminal or pressure splicing connectors and soldering lugs shall be identified, installed, and used for the material of the conductor. Conductors shall not be intermixed in a terminal or splicing connector or soldering lug where physical contact occurs between dissimilar conductors unless the device is identified for the purpose and conditions of use. Materials such as solder, fluxes, inhibitors, and compounds, where employed, shall be identified for the use and shall be of a type that will not adversely affect the conductors, installation, or equipment.

Connectors and terminals for conductors more finely stranded than Class B and Class C stranding as shown in Chapter 9 Table 10 shall be identified for the specific conductor class or classes.

(A) Terminals. Connection of conductors to terminal parts shall ensure a mechanically secure electrical connection without damaging the conductors and shall be made by means of pressure connectors (including set-screw type), solder lugs, or splices to flexible leads. Connection by means of wire-binding screws or studs and nuts that have upturned lugs or the equivalent shall be permitted for 10 AWG or smaller conductors.

Terminals for more than one conductor and terminals used to connect aluminum shall be so identified.

(B) Splices. Conductors shall be spliced or joined with splicing devices identified for the use or by brazing, welding, or soldering with a fusible metal or alloy. Soldered splices shall first be spliced or joined so as to be mechanically and electrically secure without solder and then be soldered. All splices and joints and the free ends of conductors shall be covered with an insulation equivalent to that of the conductors or with an identified insulating device.

Wire connectors or splicing means installed on conductors for direct burial shall be listed for such use.

(C) Temperature Limitations. The temperature rating associated with the ampacity of a conductor shall be selected and coordinated so as not to exceed the lowest temperature rating of any connected termination, conductor, or device. Conductors with temperature ratings higher than specified for terminations shall be permitted to be used for ampacity adjustment, correction, or both.

Δ **(1) Equipment Provisions.** The determination of termination provisions of equipment shall be based on 110.14(C)(1)(a) or 110.14(C)(1)(b). Unless the equipment is listed and marked otherwise, conductor ampacities used in determining equipment termination provisions shall be based on Table 310.16 as appropriately modified by 310.12.

(a) Termination provisions of equipment for circuits rated 100 amperes or less, or marked for 14 AWG through 1 AWG conductors, shall be used only for one of the following:

(1) Conductors rated 60°C (140°F).
(2) Conductors with higher temperature ratings, provided the ampacity of such conductors is determined based on the 60°C (140°F) ampacity of the conductor size used.
(3) Conductors with higher temperature ratings if the equipment is listed and identified for use with such conductors.
(4) For motors marked with design letters B, C, or D, conductors having an insulation rating of 75°C (167°F) or higher shall be permitted to be used, provided the ampacity of such conductors does not exceed the 75°C (167°F) ampacity.

(b) Termination provisions of equipment for circuits rated over 100 amperes, or marked for conductors larger than 1 AWG, shall be used only for one of the following:

(1) Conductors rated 75°C (167°F)
(2) Conductors with higher temperature ratings, provided the ampacity of such conductors does not exceed the 75°C (167°F) ampacity of the conductor size used, or up to their ampacity if the equipment is listed and identified for use with such conductors

(2) Separate Connector Provisions. Separately installed pressure connectors shall be used with conductors at the ampacities not exceeding the ampacity at the listed and identified temperature rating of the connector.

Informational Note: Equipment markings or listing information may additionally restrict the sizing and temperature ratings of connected conductors.

Δ **(D) Terminal Connection Torque.** Tightening torque values for terminal connections shall be as indicated on equipment or in installation instructions provided by the manufacturer. An approved means shall be used to achieve the indicated torque value.

Informational Note No. 1: Examples of approved means of achieving the indicated torque values include torque tools or devices such as shear bolts or breakaway-style devices with visual indicators that demonstrate that the proper torque has been applied.

Informational Note No. 2: See UL Standard 486A-486B, *Standard for Safety-Wire Connectors*, Informative Annex I for torque values in the absence of manufacturer's recommendations.The equipment manufacturer can be contacted if numeric torque values are not indicated on the equipment or if the installation instructions are not available.

Informational Note No. 3: See NFPA 70B, *Standard for Electrical Equipment Maintenance*, Section 7.2 for torquing threaded connections and terminations.

110.15 High-Leg Marking. On a 4-wire, delta-connected system where the midpoint of one phase winding is grounded, only the conductor or busbar having the higher phase voltage to ground shall be durably and permanently marked orange in color by an outer finish or by other effective means such that orange is visible at all splices and terminations. Such identification shall be placed at each point on the system where a connection is made if the grounded conductor is also present.

110.16 Arc-Flash Hazard Marking. In other than dwelling units, a permanent arc flash marking shall be field or factory applied to service equipment and feeder-supplied equipment, such as switchboards, switchgear, enclosed panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized. The marking shall comply with 110.21(B), be located so as to be clearly visible to qualified persons, and be in accordance with applicable industry practice, containing the following information:

(1) The nominal system voltage
(2) The arc flash boundary
(3) The available incident energy or minimum required level of personal protective equipment
(4) The date the assessment was completed

Informational Note No. 1: See ANSI Z535.4-2011 (R2017), *Product Safety Signs and Labels*, for guidelines for the design of safety signs and labels for application to products.

Informational Note No. 2: See NFPA *70E, Standard for Electrical Safety in the Workplace*, for applicable industry practices for equipment marking. This standard provides specific criteria for developing arc-flash labels for equipment that provides nominal system voltage, incident energy levels, arc-flash boundaries, minimum required levels of personal protective equipment, and so forth.

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Δ **110.17 Servicing of Equipment.** Servicing shall be performed by qualified persons trained in servicing of equipment and shall comply with the following:

(1) The servicing shall be performed in accordance with the original equipment manufacturer's instructions and information included in the listing information, applicable industry standards, or as approved by the authority having jurisdiction.
(2) The servicing shall be performed using identified replacement parts that are verified under applicable product standards. The replacement parts shall comply with at least one of the following:
   a. Be provided by the original equipment manufacturer
   b. Be designed by an engineer experienced in the design of replacement parts for the type of equipment being serviced
   c. Be approved by the authority having jurisdiction

Informational Note: For equipment that is not listed or field labeled, or for which components are no longer available from the original equipment manufacturer, one way to determine suitability is to review the documentation that accompanies the replacement parts.

110.18 Arcing Parts. Parts of electrical equipment that in ordinary operation produce arcs, sparks, flames, or molten metal shall be enclosed or separated and isolated from all combustible material.

110.19 Light and Power from Railway Conductors. Circuits for lighting and power shall not be connected to any system that contains trolley wires with a ground return.

Exception: Such circuit connections shall be permitted in car houses, power houses, or passenger and freight stations operated in connection with electric railways.

Δ **110.20 Reconditioned Equipment.** Reconditioned equipment shall be permitted except where prohibited elsewhere in this code. Equipment that is restored to operating condition shall be reconditioned with identified replacement parts and verified under applicable standards that are either provided by the original equipment manufacturer or that are designed by an engineer experienced in the design of replacement parts for the type of equipment being reconditioned.

Informational Note: See Article 100 for the definition of *equipment*.

(A) Equipment Required to Be Listed. Equipment that is reconditioned and required by this code to be listed shall be listed or field labeled as reconditioned using available instructions from the original equipment manufacturer.

Δ **(B) Equipment Not Required to Be Listed.** Equipment that is reconditioned and not required by this code to be listed shall comply with one of the following:

(1) Be listed or field labeled as reconditioned
(2) Have the reconditioning performed in accordance with the original equipment manufacturer instructions

Δ **(C) Approved Equipment.** If the options specified in 110.20(A) or 110.20(B) are not available, the authority having jurisdiction shall be permitted to approve reconditioned equipment, and the reconditioner shall provide the authority having jurisdiction with documentation of the changes to the product.

110.21 Marking.

(A) Equipment Markings.

(1) General. The manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product can be identified shall be applied or affixed onto all electrical equipment. Other markings that indicate voltage, current, wattage, or other ratings shall be provided as specified elsewhere in this code. The marking shall be of sufficient durability to withstand the environment involved.

Δ **(2) Reconditioned Equipment.** Reconditioned equipment shall be marked with the following:

(1) Name, trademark, or other descriptive marking of the organization that performed the reconditioning
(2) The date of the reconditioning
(3) The term *reconditioned* or other approved wording or symbol indicating that the equipment has been reconditioned

The original listing mark shall be removed or made permanently illegible. The equipment nameplate shall not be required to be removed or made permanently illegible, only the part of the nameplate that includes the listing mark, if applicable. Approval of the reconditioned equipment shall not be based solely on the equipment's original listing.

Exception: In industrial occupancies, where conditions of maintenance and supervision ensure that only qualified persons service the equipment, the markings indicated in 110.21(A)(2) shall not be required for equipment that is reconditioned by the owner or operator as part of a regular equipment maintenance program.

Informational Note No. 1: ANSI-approved standards are available for application of reconditioned and refurbished equipment.

Informational Note No. 2: The term *reconditioned* may be interchangeable with the terms *rebuilt*, *refurbished*, or *remanufactured* even though these are sometimes different processes.

Δ **(B) Field-Applied Hazard Markings.** Where caution, warning, or danger hazard markings such as labels or signs are required by this code, the markings shall meet the following requirements:

(1) The marking shall be of sufficient durability to withstand the environment involved and warn of the hazards using effective words, colors, symbols, or any combination thereof.

Informational Note No. 1: See ANSI Z535.2, *Environmental and Facility Safety Signs*, which describes the design, application, and use of safety signs in facilities and in the environment.

Informational Note No. 2: See ANSI Z535.4, *Product Safety Signs and Labels*, which details the design, application, use, and placement of safety signs and labels on a wide variety of products.

(2) The marking shall be permanently affixed to the equipment or wiring method and shall not be handwritten.

Exception to (2): Portions of the markings that are variable, or that could be subject to changes, shall be permitted to be handwritten and shall be legible.

110.22 Identification of Disconnecting Means.

(A) General. Each disconnecting means shall be legibly marked to indicate its purpose unless located and arranged so the purpose is evident. In other than one- or two-family dwellings, the marking shall include the identification and location of the circuit source that supplies the disconnecting means unless located and arranged so the identification and location of the circuit source is evident. The marking shall be of sufficient durability to withstand the environment involved.

(B) Engineered Series Combination Systems. Equipment enclosures for circuit breakers or fuses applied in compliance with series combination ratings selected under engineering supervision in accordance with 240.86(A) shall be legibly marked in the field as directed by the engineer to indicate the equipment has been applied with a series combination rating. The marking shall meet the requirements in 110.21(B) and shall be readily visible and state the following:

CAUTION — ENGINEERED SERIES COMBINATION SYSTEM RATED _____ AMPERES. IDENTIFIED REPLACEMENT COMPONENTS REQUIRED.

(C) Tested Series Combination Systems. Equipment enclosures for circuit breakers or fuses applied in compliance with the series combination ratings marked on the equipment by the manufacturer in accordance with 240.86(B) shall be legibly marked in the field to indicate the equipment has been applied with a series combination rating. The marking shall meet the requirements in 110.21(B) and shall be readily visible and state the following:

CAUTION — SERIES COMBINATION SYSTEM RATED ____ AMPERES. IDENTIFIED REPLACEMENT COMPONENTS REQUIRED.

Informational Note: See IEEE 3004.5-2014 *Recommended Practice for the Application of Low-Voltage Circuit Breakers in Industrial and Commercial Power Systems*, for further information on series tested systems.

110.23 Current Transformers. Unused current transformers associated with potentially energized circuits shall be short-circuited.

110.24 Available Fault Current.

Δ **(A) Field Marking.** Service equipment at other than dwelling units shall be legibly marked in the field with the available fault current. The field markings shall include the date the fault-current calculation was performed and comply with 110.21(B). The calculation shall be documented and made available to those authorized to design, install, inspect, maintain, or operate the system.

Informational Note No. 1: The available fault-current markings addressed in 110.24are related to required short-circuit current and interrupting ratings of equipment.

Informational Note No. 2: Values of available fault current for use in determining appropriate minimum short-circuit current and interrupting ratings of service equipment are available from electric utilities in published or other forms.

(B) Modifications. When modifications to the electrical installation occur that affect the available fault current at the service, the available fault current shall be verified or recalculated as necessary to ensure the service equipment ratings are sufficient for the available fault current at the line terminals of the equipment. The required field markings in 110.24(A) shall be adjusted to reflect the new level of available fault current.

Exception: The field marking requirements in 110.24(A) and 110.24(B) shall not be required in industrial installations where conditions of maintenance and supervision ensure that only qualified persons service the equipment.

110.25 Lockable Disconnecting Means. If a disconnecting means is required to be lockable open elsewhere in this code, it shall be capable of being locked in the open position. The provisions for locking shall remain in place with or without the lock installed.

Exception: Locking provisions for a cord and plug connection shall not be required to remain in place without the lock installed.

Part II. Not Over 1000 Volts ac, 1500 Volts dc, Nominal

110.26 Spaces About Electrical Equipment. Working space, and access to and egress from working space, shall be provided and maintained about all electrical equipment to permit ready and safe operation and maintenance of such equipment. Open equipment doors shall not impede access to and egress from the working space. Access or egress is impeded if one or more simultaneously opened equipment doors restrict working space access to be less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high when such doors are or can be opened 90 degrees.

Δ **(A) Working Space.** Working space for equipment likely to require examination, adjustment, servicing, or maintenance while energized shall comply with the dimensions of 110.26(A)(1), 110.26(A)(2), 110.26(A)(3), and 110.26(A)(4) or as required or permitted elsewhere in this code. By special permission, smaller working spaces shall be permitted where all exposed live parts operate at not greater than 30 volts rms, 42 volts peak, or 60 volts dc.

Informational Note: See NFPA *70E, Standard for Electrical Safety in the Workplace*, for guidance, such as determining severity of potential exposure and planning safe work practices including establishing an electrically safe work condition, arc flash labeling, and selecting personal protective equipment.

Δ **(1) Depth of Working Space.** The depth of the working space in the direction of live parts shall not be less than that specified in Table 110.26(A)(1) unless the requirements of 110.26(A)(1)(a)or 110.26(A)(1)(b) are met. Distances shall be measured from the enclosure front or opening, if such live parts are enclosed.

(a) *Dead-Front Assemblies.* Working space shall not be required in the back or sides of assemblies, such as dead-front switchboards, switchgear, or motor control centers, where all connections and all renewable or adjustable parts, such as fuses or switches, are accessible from locations other than the back or sides. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum horizontal working space of 762 mm (30 in.) shall be provided.

(b) *Existing Buildings.* In existing buildings where electrical equipment is being replaced, Condition 2 working clearance shall be permitted between dead-front switchboards,

switchgear, enclosed panelboards, or motor control centers located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.

(2) Width of Working Space. The width of the working space in front of the electrical equipment shall be the width of the equipment or 762 mm (30 in.), whichever is greater. In all cases, the work space shall permit at least a 90-degree opening of equipment doors or hinged panels.

(3) Height of Working Space. The work space shall be clear and extend from the grade, floor, or platform to a height of 2.0 m (6½ ft) or the height of the equipment, whichever is greater. Within the height requirements of this section, other equipment or support structures, such as concrete pads, associated with the electrical installation and located above or below the electrical equipment shall be permitted to extend not more than 150 mm (6 in.) beyond the front of the electrical equipment.

Exception No. 1: On battery systems mounted on open racks, the top clearance shall comply with 480.10(D).

Exception No. 2: In existing dwelling units, service equipment or enclosed panelboards that do not exceed 200 amperes shall be permitted in spaces where the height of the working space is less than 2.0 m (6½ ft).

Exception No. 3: Meters that are installed in meter sockets shall be permitted to extend beyond the other equipment. The meter socket shall be required to follow the rules of this section.

Δ **(4) Limited Access.** Where equipment likely to require examination, adjustment, servicing, or maintenance while energized is required by installation instructions or function to be located in a space with limited access, all of the following shall apply:

(1) Where equipment is installed above a lay-in ceiling, there shall be an opening not smaller than 559 mm × 559 mm (22 in. × 22 in.), or in a crawl space, there shall be an accessible opening not smaller than 559 mm × 762 mm (22 in. × 30 in.).
(2) The width of the working space shall be the width of the equipment enclosure or a minimum of 762 mm (30 in.), whichever is greater.
(3) All enclosure doors or hinged panels shall be capable of opening a minimum of 90 degrees.
(4) The space in front of the enclosure shall comply with the depth requirements of Table 110.26(A)(1) and shall be unobstructed to the floor by fixed cabinets, walls, or partitions. Space reductions in accordance with 110.26(A) shall be permitted. The maximum height of the working space shall be the height necessary to install the equipment in the limited space. A horizontal ceiling structural member or access panel shall be permitted in this space provided the location of weight-bearing structural members does not result in a side reach of more than 150 mm (6 in.) to work within the enclosure.

(5) Separation from High-Voltage Equipment. Where switches, cutouts, or other equipment operating at 1000 volts ac, 1500 volts dc, nominal, or less are installed in a vault, room, or enclosure where there are exposed live parts or exposed wiring operating over 1000 volts ac, 1500 volts dc, nominal, the high-voltage equipment shall be effectively separated from the space occupied by the equipment operating at 1000 volts ac, 1500 volts dc, nominal, or less by a suitable partition, fence, or screen.

(6) Grade, Floor, or Working Platform. The grade, floor, or platform in the required working space shall be kept clear and as level and flat as practical for the entire required depth and width of the working space.

(B) Clear Spaces. Working space required by this section shall not be used for storage. When normally enclosed live parts are exposed for inspection or servicing, the working space, if in a passageway or general open space, shall be suitably guarded.

(C) Entrance to and Egress from Working Space.

(1) Minimum Required. At least one entrance of sufficient area shall be provided to give access to and egress from working space about electrical equipment.

Δ **(2) Large Equipment.** For large equipment that contains OCPDs, switching devices, or control devices, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high at each end of the working space. This requirement shall apply to either of the following conditions:

(1) For equipment rated 1200 amperes or more and over 1.8 m (6 ft) wide
(2) For disconnecting means installed in accordance with 225.33(A) or 230.71(B) where the combined ampere rating is 1200 amperes or more and where the combined width is over 1.8 m (6 ft)

A single entrance to and egress from the required working space shall be permitted where either of the conditions in 110.26(C)(2)(a) or 110.26(C)(2)(b) is met.

(a) *Unobstructed Egress.* Where the location permits a continuous and unobstructed way of egress travel, a single entrance to the working space shall be permitted.

(b) *Extra Working Space.* Where the depth of the working space is twice that required by 110.26(A)(1), a single entrance

Δ **Table 110.26(A)(1) Working Spaces**

Nominal Voltage to Ground	Minimum Clear Distance		
	Condition 1	Condition 2	Condition 3
0–150 ac or dc	900 mm (3 ft)	900 mm (3 ft)	900 mm (3 ft)
151–600 ac or dc	900 mm (3 ft)	1.0 m (3 ft 6 in.)	1.2 m (4 ft)
601–1000 ac or 601–1500 dc	900 mm (3 ft)	1.2 m (4 ft)	1.5 m (5 ft)

Note: Where the conditions are as follows:
Condition 1 — Exposed or enclosed live parts on one side of the working space and no exposed or enclosed live or grounded parts on the other side of the working space, or exposed or enclosed live parts on both sides of the working space that are effectively guarded by insulating materials.
Condition 2 — Exposed or enclosed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.
Condition 3 — Exposed or enclosed live parts on both sides of the working space.

shall be permitted. It shall be located such that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.26(A)(1) for equipment operating at that voltage and in that condition.

(3) Personnel Doors. Where equipment rated 800 amperes or more that contains OCPDs, switching devices, or control devices is installed and there are personnel doors intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the doors shall open at least 90 degrees in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.

Informational Note: See UL 305, *Standard For Panic Hardware*, for additional information on panic hardware, and see UL 10C, *Standard for Safety for Positive Pressure Fire Tests of Door Assemblies*, for additional information.

Δ **(D) Illumination.** Illumination shall be provided for all working spaces about service equipment, switchboards, switchgear, enclosed panelboards, or motor control centers installed indoors. Control of all luminaires by automatic means shall not be permitted for the working space. Additional lighting outlets shall not be required where the work space is illuminated by an adjacent light source or as permitted by 210.70(A)(1) Exception No. 1 for switched receptacles.

(E) Dedicated Equipment Space. All service equipment, switchboards, switchgear, enclosed panelboards, and motor control centers shall be located in dedicated spaces and protected from damage.

Exception: Control equipment that by its very nature or because of other rules of the code must be adjacent to or within sight of its operating machinery shall be permitted in those locations.

Δ **(1) Indoor.** Indoor installations shall comply with 110.26(E)(1)(a) through 110.26(E)(1)(d).

(a) *Dedicated Electrical Space.* The space equal to the width and depth of the equipment and extending from the floor to a height of 1.8 m (6 ft) above the equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. No piping, ducts, leak protection apparatus, or other equipment foreign to the electrical installation shall be located in this zone.

Exception: Suspended ceilings with removable panels shall be permitted within the 1.8 m (6 ft) zone.

(b) *Foreign Systems.* The area above the dedicated space required by 110.26(E)(1)(a) shall be permitted to contain foreign systems, provided protection is installed to avoid damage to the electrical equipment from condensation, leaks, or breaks in such foreign systems.

(c) *Sprinkler Protection.* Sprinkler protection shall be permitted for the dedicated space where the piping complies with this section.

(d) *Suspended Ceilings.* A dropped, suspended, or similar ceiling that does not add strength to the building structure shall not be considered a structural ceiling.

Δ **(2) Outdoor.** Outdoor installations shall comply with 110.26(E)(2)(a) through 110.26(E)(2)(c).

(a) *Installation Requirements.* Outdoor electrical equipment shall be the following:

(1) Installed in identified enclosures
(2) Protected from accidental contact by unauthorized personnel or by vehicular traffic
(3) Protected from accidental spillage or leakage from piping systems

(b) *Work Space.* The working clearance space shall include the zone described in 110.26(A). No architectural appurtenance or other equipment shall be located in this zone.

(c) *Dedicated Equipment Space.* The space equal to the width and depth of the equipment, and extending from grade to a height of 1.8 m (6 ft) above the equipment, shall be dedicated to the electrical installation. No piping or other equipment foreign to the electrical installation shall be located in this zone.

Exception: Structural overhangs or roof extensions shall be permitted in this zone.

(F) Locked Electrical Equipment Rooms or Enclosures. Electrical equipment rooms or enclosures housing electrical apparatus that are controlled by locks shall be considered accessible to qualified persons.

110.27 Guarding of Live Parts.

Δ **(A) Live Parts Guarded Against Accidental Contact.** Except as elsewhere required or permitted by this code, live parts of electrical equipment operating at 50 volts ac/dc to 1000 volts ac, 1500 volts dc, nominal, shall be guarded against accidental contact by approved enclosures or by any of the following means:

(1) By location in a room, vault, or similar enclosure that is accessible only to qualified persons.
(2) By permanent, substantial partitions or screens arranged so that only qualified persons have access to the space within reach of the live parts. Any openings in such partitions or screens shall be sized and located so that persons are not likely to come into accidental contact with the live parts or to bring conducting objects into contact with them.
(3) By location on a balcony, gallery, or platform elevated and arranged so as to exclude unqualified persons.
(4) By elevation above the floor or other working surface as follows:
   a. A minimum of 2.5 m (8 ft) for 50 volts to 300 volts between ungrounded conductors
   b. A minimum of 2.6 m (8 ft 6 in.) for 301 volts to 600 volts between ungrounded conductors
   c. A minimum of 2.62 m (8 ft 7 in.) for 601 volts to 1000 volts between ungrounded conductors

(B) Prevent Physical Damage. In locations where electrical equipment is likely to be exposed to physical damage, enclosures or guards shall be so arranged and of such strength as to prevent such damage.

(C) Warning Signs. Entrances to rooms and other guarded locations that contain exposed live parts shall be marked with conspicuous warning signs forbidding unqualified persons to enter. The marking shall comply with 110.21(B).

Δ **110.28 Enclosure Types.** Other than surrounding fences or walls, enclosures of switchboards, switchgear, enclosed panelboards, industrial control panels, motor control centers, meter sockets, enclosed switches, transfer switches, power outlets, circuit breakers, adjustable-speed drive systems, pullout switches, portable power distribution equipment, termination boxes, general-purpose transformers, fire pump controllers,

fire pump motors, and motor controllers, and intended for such locations, shall be marked with an enclosure-type number as shown in Table 110.28.

Table 110.28 shall be used for selecting these enclosures for use in specific locations other than hazardous (classified) locations. The enclosures are not intended to protect against conditions such as condensation, icing, corrosion, or contamination that may occur within the enclosure or enter via the raceway or unsealed openings.

Informational Note No. 1: The term *raintight* is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 4, 4X, 6, and 6P. The term *rainproof* is typically used in conjunction with Enclosure Types 3R and 3RX. The term *watertight* is typically used in conjunction with Enclosure Types 4, 4X, 6, and 6P. The term *driptight* is typically used in conjunction with Enclosure Types 2, 5, 12, 12K, and 13. The term *dusttight* is typically used in conjunction with Enclosure Types 3, 3S, 3SX, 3X, 4, 4X, 5, 6, 6P, 12, 12K, and 13.

Informational Note No. 2: See ANSI/IEC 60529, *Degrees of Protection Provided by Enclosures*, for ingress protection (IP) ratings.

Informational Note No. 3: See 502.10(A)(3), 502.10(B)(4), 503.10(A)(2), and 506.15(C)(3) for information on the use of dusttight enclosures in hazardous locations.

Informational Note No. 4: Some enclosure types, such as 12, 12K, or 13 enclosures, may be marked with an ancillary "-XH" for corrosive and hosedown capable indoor enclosure.

Informational Note No. 5: Some type 4X enclosures may be marked "indoor only."

Informational Note No. 6: See NEMA EN 10250-2024 (formerly known as NEMA 250), *Enclosures for Electrical Equipment (1000 Volts Maximum)*, for the description of the "Enclosure Type Rating: Ancillary — PW for Pressure Wash and XH for Corrosive — and Hosedown — Capable Indoor Enclosures."

Δ **110.29 In Sight From (Within Sight From, Within Sight).** Where this code specifies that equipment shall be "in sight from," "within sight from," or "within sight of" a building or structure or other equipment, the specified equipment shall be visible and not more than 15 m (50 ft) from the building, structure, or other equipment.

Part III. Over 1000 Volts ac, 1500 Volts dc, Nominal

Δ **110.30 General.** Conductors and equipment used on circuits over 1000 volts ac, 1500 volts dc, nominal, shall comply with Article 110 Part I and with 110.30 through 110.41, which supplement or modify Part I. Part III shall not apply to equipment on the supply side of the service point.

110.31 Enclosure for Electrical Installations. Electrical installations in a vault, room, or closet or in an area surrounded by a wall, screen, or fence, access to which is controlled by locks or other approved means, shall be considered to be accessible to qualified persons only. The type of enclosure used in a given case shall be designed and constructed according to the nature and degree of the hazards associated with the installation.

For installations other than equipment as described in 110.31(D), a wall, screen, or fence shall be used to enclose an

Δ **Table 110.28 Enclosure Selection**

Provides a Degree of Protection Against the Following Environmental Conditions	For Outdoor Use — Enclosure Type Number									
	3	3R	3S	3X	3RX	3SX	4	4X	6	6P
Incidental contact with the enclosed equipment	X	X	X	X	X	X	X	X	X	X
Rain, snow, and sleet	X	X	X	X	X	X	X	X	X	X
Sleet*	—	—	X	—	—	X	—	—	—	—
Windblown dust	X	—	X	X	—	X	X	X	X	X
Hosedown	—	—	—	—	—	—	X	X	X	X
Corrosive agents	—	—	—	X	X	X	—	X	—	X
Temporary submersion	—	—	—	—	—	—	—	—	X	X
Prolonged submersion	—	—	—	—	—	—	—	—	—	X

Provides a Degree of Protection Against the Following Environmental Conditions	For Indoor Use — Enclosure Type Number									
	1	2	4	4X	5	6	6P	12	12K	13
Incidental contact with the enclosed equipment	X	X	X	X	X	X	X	X	X	X
Falling dirt	X	X	X	X	X	X	X	X	X	X
Falling liquids and light splashing	—	X	X	X	X	X	X	X	X	X
Circulating dust, lint, fibers, and flyings	—	—	X	X	—	X	X	X	X	X
Settling airborne dust, lint, fibers, and flyings	—	—	X	X	X	X	X	X	X	X
Hosedown and splashing water	—	—	X	X	—	X	X	—	—	—
Oil and coolant seepage	—	—	—	—	—	—	—	X	X	X
Oil or coolant spraying and splashing	—	—	—	—	—	—	—	—	—	X
Corrosive agents	—	—	—	X	—	—	X	—	—	—
Temporary submersion	—	—	—	—	—	X	X	—	—	—
Prolonged submersion	—	—	—	—	—	—	X	—	—	—

*The mechanism shall be operable when ice covered.

outdoor electrical installation to deter access by persons who are not qualified. A fence shall not be less than 2.1 m (7 ft) in height or a combination of 1.8 m (6 ft) or more of fence fabric and a 300 mm (1 ft) or more extension utilizing three or more strands of barbed wire or equivalent. The distance from the fence to live parts shall be not less than given in Table 110.31.

Informational Note: See ANSI/IEEE C2-2023, *National Electrical Safety Code*, for clearances of conductors for specific system voltages and typical BIL ratings.

Δ **(A) Electrical Vaults.** Where an electrical vault is required or specified for conductors and equipment 110.31(A)(1) to 110.31(A)(5) shall apply.

(1) Walls and Roof. The walls and roof shall be constructed of materials that have adequate structural strength for the conditions, with a minimum fire rating of 3 hours. For the purpose of this section, studs and wallboard construction shall not be permitted.

(2) Floors. The floors of vaults in contact with the earth shall be of concrete that is not less than 102 mm (4 in.) thick, but where the vault is constructed with a vacant space or other stories below it, the floor shall have adequate structural strength for the load imposed on it and a minimum fire resistance of 3 hours.

(3) Doors. Each doorway leading into a vault from the building interior shall be provided with a tight-fitting door that has a minimum fire rating of 3 hours. The authority having jurisdiction shall be permitted to require such a door for an exterior wall opening where conditions warrant.

Exception to (1), (2), and (3): Where the vault is protected with automatic sprinkler, water spray, carbon dioxide, or halon, construction with a 1-hour rating shall be permitted.

(4) Locks. Doors shall be equipped with locks, and doors shall be kept locked, with access allowed only to qualified persons. Personnel doors shall open at least 90 degrees in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.

Informational Note: See UL 305, *Standard for Panic Hardware*, for additional information, and UL10C, *Standard for Safety for Positive Pressure Fire Tests of Door Assemblies.*

Δ **(5) Transformers.** Where a transformer is installed in a vault as required by Article 450 Part II, the vault shall be constructed in accordance with Article 450 Part III.

Informational Note No. 1: See ASTM E119-2022, *Method for Fire Tests of Building Construction and Materials*, for additional information, and see NFPA 80, *Standard for Fire Doors and Other Opening Protectives.*

Informational Note No. 2: A typical 3-hour construction is 150 mm (6 in.) thick reinforced concrete.

Δ **Table 110.31 Minimum Distance from Fence to Live Parts**

	Minimum Distance to Live Parts	
Nominal Voltage	**m**	**ft**
1001–13,799 ac or 1501–13,799 dc	3.05	10
13,800–230,000 ac or dc	4.57	15
Over 230,000 ac or dc	5.49	18

(B) Indoor Installations.

(1) In Places Accessible to Unqualified Persons. Indoor electrical installations that are accessible to unqualified persons shall be made with metal-enclosed equipment. Switchgear, transformers, pull boxes, connection boxes, and other similar associated equipment shall be marked with appropriate caution signs. Openings in ventilated dry-type transformers or similar openings in other equipment shall be designed so that foreign objects inserted through these openings are deflected from energized parts.

(2) In Places Accessible to Qualified Persons Only. Indoor electrical installations considered accessible only to qualified persons in accordance with this section shall comply with 110.34, 110.36, and 495.24.

(C) Outdoor Installations.

Δ **(1) In Places Accessible to Unqualified Persons.** Outdoor electrical installations that are open to unqualified persons shall comply with Article 267 Part I.

(2) In Places Accessible to Qualified Persons Only. Outdoor electrical installations that have exposed live parts shall be accessible to qualified persons only in accordance with the first paragraph of this section and shall comply with 110.34, 110.36, and 495.24.

(D) Enclosed Equipment Accessible to Unqualified Persons. Ventilating or similar openings in equipment shall be designed such that foreign objects inserted through these openings are deflected from energized parts. Where exposed to physical damage from vehicular traffic, suitable guards shall be provided. Equipment located outdoors and accessible to unqualified persons shall be designed such that exposed nuts or bolts cannot be readily removed, permitting access to live parts. Where equipment is accessible to unqualified persons and the bottom of the enclosure is less than 2.5 m (8 ft) above the floor or grade level, the enclosure door or hinged cover shall be kept locked. Doors and covers of enclosures used solely as pull boxes, splice boxes, or junction boxes shall be locked, bolted, or screwed on. Underground box covers that weigh over 45.4 kg (100 lb) shall be considered as meeting this requirement.

110.32 Work Space About Equipment. Sufficient space shall be provided and maintained about electrical equipment to permit ready and safe operation and maintenance of such equipment. Where energized parts are exposed, the minimum clear work space shall be not less than 2.0 m (6½ ft) high (measured vertically from the floor or platform) and the width of the equipment or 914 mm (3 ft) wide (measured parallel to the equipment), whichever is greater. The depth shall be as required in 110.34(A). In all cases, the work space shall permit at least a 90-degree opening of doors or hinged panels. Within the height requirements of this section, other equipment that is associated with the electrical installation and is located above or below the electrical equipment shall be permitted to extend not more than 150 mm (6 in.) beyond the front of the electrical equipment. Working space required by this section shall not be used for storage. When normally enclosed live parts are exposed for inspection or servicing, the working space, if in a passageway or general open space, shall be suitably guarded.

110.33 Entrance to Enclosures and Access to Working Space.

(A) Entrance. At least one entrance to enclosures for electrical installations as described in 110.31 not less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high shall be provided to give access to the working space about electrical equipment.

Open equipment doors shall not impede access to and egress from the working space. Access or egress is impeded if one or more simultaneously opened equipment doors restrict working space access to be less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high.

Δ **(1) Large Equipment.** On switchgear and control panels exceeding 1.8 m (6 ft) in width, there shall be one entrance at each end of the equipment. A single entrance to the required working space shall be permitted where either of the conditions in 110.33(A)(1)(a) or 110.33(A)(1)(b) is met.

(a) *Unobstructed Exit.* Where the location permits a continuous and unobstructed way of exit travel, a single entrance to the working space shall be permitted.

(b) *Extra Working Space.* Where the depth of the working space is twice that required by 110.34(A), a single entrance shall be permitted. It shall be located so that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.34(A) for equipment operating at that voltage and in that condition.

Δ **(2) Guarding.** Where bare energized parts at any voltage or insulated energized parts are located adjacent to such entrance, they shall be suitably guarded.

(3) Personnel Doors. Where there are personnel doors intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the doors shall open at least 90 degrees in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.

Informational Note: See UL 305, *Standard for Panic Hardware*, for additional information, and UL 10C, *Standard for Safety for Positive Pressure Fire Tests of Door Assemblies.*

(B) Access. Permanent ladders or stairways shall be provided to give safe access to the working space around electrical equipment installed on platforms, balconies, or mezzanine floors or in attic or roof rooms or spaces.

110.34 Work Space and Guarding.

(A) Working Space. Except as elsewhere required or permitted in this code, equipment likely to require examination, adjustment, servicing, or maintenance while energized shall have clear working space in the direction of access to live parts of the electrical equipment and shall be not less than specified in Table 110.34(A). Distances shall be measured from the live parts, if such are exposed, or from the enclosure front or opening if such live parts are enclosed. The grade, floor, or platform in the required working space shall be kept clear, and the floor, grade, or platform in the working space shall be as level and flat as practical for the entire depth and width of the working space.

Exception: Working space shall not be required in back of equipment such as switchgear or control assemblies where there are no renewable or adjustable parts (such as fuses or switches) on the back and where all connections are accessible from locations other than the back. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum working space of 762 mm (30 in.) horizontally shall be provided.

(B) Separation from High-Voltage Equipment. Where switches, cutouts, or other equipment operating at not over 1000 volts ac, 1500 volts dc, nominal, are installed in a vault, room, or enclosure where there are exposed live parts or exposed wiring operating at over 1000 volts ac, 1500 volts dc, nominal, the high-voltage equipment shall be effectively separated from the space occupied by the equipment operating at 1000 volts ac, 1500 volts dc, nominal, or less by a suitable partition, fence, or screen.

Exception: Switches or other equipment operating at 1000 volts ac, 1500 volts dc, nominal, or less and serving only equipment within the high-voltage vault, room, or enclosure shall be permitted to be installed in the high-voltage vault, room, or enclosure without a partition, fence, or screen if accessible to qualified persons only.

Δ **(C) Locked Rooms or Enclosures.** The entrance to all buildings, vaults, rooms, or enclosures containing exposed live parts or exposed conductors shall be kept locked unless such entrances are under the observation of a qualified person at all times.

Permanent and conspicuous danger signs shall be provided. The danger sign shall meet the requirements in 110.21(B) and shall read as follows:

DANGER — HIGH VOLTAGE — KEEP OUT

(D) Illumination. Illumination shall be provided for all working spaces about electrical equipment. Control by automatic means only shall not be permitted. The lighting outlets shall be arranged so that persons changing lamps or making repairs on the lighting system are not endangered by live parts or other equipment.

Δ **Table 110.34(A) Minimum Depth of Clear Working Space at Electrical Equipment**

Nominal Voltage to Ground	Minimum Clear Distance		
	Condition 1	Condition 2	Condition 3
1001–2500 ac or 1501–2500 dc	900 mm (3 ft)	1.2 m (4 ft)	1.5 m (5 ft)
2501–9000 ac or dc	1.2 m (4 ft)	1.5 m (5 ft)	1.8 m (6 ft)
9001–25,000 ac or dc	1.5 m (5 ft)	1.8 m (6 ft)	2.8 m (9 ft)
25,001–75,000 ac or dc	1.8 m (6 ft)	2.5 m (8 ft)	3.0 m (10 ft)
Above 75,000 ac or dc	2.5 m (8 ft)	3.0 m (10 ft)	3.7 m (12 ft)

Note: Where the conditions are as follows:
Condition 1 — Exposed or enclosed live parts on one side of the working space and no exposed or enclosed live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.
Condition 2 — Exposed or enclosed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.
Condition 3 — Exposed or enclosed live parts on both sides of the working space.

The points of control shall be located so that persons are not likely to come in contact with any live part or moving part of the equipment while turning on the lights.

(E) Elevation of Unguarded Live Parts. Unguarded live parts above working space shall be maintained at elevations not less than required by Table 110.34(E).

(F) Protection of Service Equipment, Switchgear, and Industrial Control Assemblies. Pipes or ducts foreign to the electrical installation and requiring periodic maintenance or whose malfunction would endanger the operation of the electrical system shall not be located in the vicinity of the service equipment, switchgear, or industrial control assemblies. Protection shall be provided where necessary to avoid damage from condensation leaks and breaks in such foreign systems. Piping and other facilities shall not be considered foreign if provided for fire protection of the electrical installation.

110.36 Circuit Conductors. Circuit conductors shall be permitted to be installed in raceways; in cable trays; as metal-clad cable Type MC; as bare wire, cable, and busbars; or as Type MV cables or conductors as provided in 305.12, 305.15, 305.38, and 305.40. Bare live conductors shall comply with 495.24.

Insulators, together with their mounting and conductor attachments, where used as supports for wires, single-conductor cables, or busbars, shall be capable of safely withstanding the maximum magnetic forces that would prevail if two or more conductors of a circuit were subjected to short-circuit current.

Exposed runs of insulated wires and cables that have a bare lead sheath or a braided outer covering shall be supported in a manner designed to prevent physical damage to the braid or sheath. Supports for lead-covered cables shall be designed to prevent electrolysis of the sheath.

N **110.39 In Sight From (Within Sight From, Within Sight).** Where this code specifies that equipment shall be "in sight from," "within sight from," or "within sight of" a building or structure or other equipment, the specified equipment shall be visible and not more than 15 m (50 ft) from the building, structure, or other equipment.

Δ **110.40 Electrical Connections.** For equipment rated over 1000 volts ac, 1500 volts dc, nominal, but not more than 2000 volts ac or dc, nominal, that is connected using other than Type MV conductors, the requirements of 110.14 shall be applicable. For all equipment connected using Type MV conductors, the requirements of 110.40(A) through 110.40(E) shall supersede those of 110.14.

N **(A) General.** Termination devices shall be identified, installed, and used for the material of the conductor. Conductors shall not be intermixed where physical contact occurs between dissimilar conductors unless the device is identified for the purpose and conditions of use. Materials such as solder, fluxes, inhibitors, and compounds, where employed, shall be identified for the use and shall be of a type that will not adversely affect the conductors, installation, or equipment. Connectors for more than one conductor shall be so identified.

Connectors and terminals for conductors shall be suitable for the conductor class or classes.

Where a listed Type MV cable joint or Type MV cable termination is supplied with a connector, only the connection means supplied by the manufacturer shall be used for installation.

Δ **Table 110.34(E) Elevation of Unguarded Live Parts Above Working Space**

Nominal Voltage Between Phases	Elevation	
	m	ft
1001–7500	2.7	9
7501–35,000	2.9	9 ft 6 in.
Over 35,000	Add 9.5 mm per kV above 35 kV	Add 0.37 in. per kV above 35 kV

N **(B) Terminals.** Connection of conductors to terminal parts shall ensure a mechanically secure electrical connection and be made by means of pressure connectors.

N **(C) Splices.** Conductors shall be spliced with splicing devices identified for the use. All splices and the free ends of conductors shall be covered with an insulation equivalent to that of the conductors or with an identified insulating device. Wire connectors or splicing means installed on conductors for direct burial shall be listed for such use.

N **(D) Temperature Limitations.** The temperature rating associated with the ampacity or temperature rating of a conductor shall be selected and coordinated so as not to exceed the lowest temperature rating of any connected termination, conductor, or device. Conductors with temperature ratings higher than specified for terminations shall be permitted to be used for ampacity adjustment, correction, or both.

N **(1) Equipment Provisions.** Termination of conductors at equipment shall be based on the ampacity for MV-90 conductors as given in Table 315.60(C)(1) through Table 315.60(C)(20), unless the equipment and the connector assembly is identified for use with 105°C (221°F) conductors. The use of MV-105 conductors, sized based on the ampacity for MV-90 conductors, shall be permitted.

N **(2) Separate Connector Provisions.** Separately installed pressure connectors shall be used with conductors at the ampacities not exceeding the ampacity at the listed and identified temperature rating of the connector.

N **(E) Terminal Connection Torque.** Tightening torque values for terminal connections shall be as indicated on equipment or in installation instructions provided by the manufacturer. An approved means shall be used to achieve the indicated torque value.

Informational Note No. 1: Examples of approved means of achieving the indicated torque values include torque tools or devices such as shear bolts or breakaway-style devices with visual indicators that demonstrate that the proper torque has been applied.

Informational Note No. 2: See NFPA 70B, *Standard for Electrical Equipment Maintenance*, for additional information for torquing threaded connections and terminations.

110.41 Inspections and Tests.

(A) Pre-energization and Operating Tests. Where required elsewhere in this code, the complete electrical system design, including settings for protective, switching, and control circuits, shall be prepared in advance and made available on request to the authority having jurisdiction and shall be tested when first installed on-site.

(B) Test Report. A test report covering the results of the tests required in 110.41(A) shall be available to the authority having jurisdiction prior to energization and made available to those authorized to install, operate, test, and maintain the system.

Part IV. Tunnel Installations over 1000 Volts ac, 1500 Volts dc, Nominal

110.51 General.

Δ **(A) Covered.** This part shall apply to the installation and use of power distribution and utilization equipment that is portable, mobile, or both, such as substations, trailers, cars, mobile shovels, draglines, hoists, drills, dredges, compressors, pumps, conveyors, underground excavators, and the like.

(B) Protection Against Physical Damage. Conductors and cables in tunnels shall be located above the tunnel floor and so placed or guarded to protect them from physical damage.

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110.53 Conductors. High-voltage conductors in tunnels shall be installed in metal raceway, Type MC cable, or other approved multiconductor cable. Multiconductor portable cable shall be permitted to supply mobile equipment.

110.54 Bonding and Equipment Grounding Conductors. All non-current-carrying metal parts of electrical equipment and all metal raceways and cable sheaths shall be solidly grounded and bonded to all metal pipes and rails at the portal and at intervals not exceeding 300 m (1000 ft) throughout the tunnel.

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110.55 Transformers, Switches, and Electrical Equipment. All transformers, switches, motor controllers, motors, rectifiers, and other equipment installed belowground shall be protected from physical damage by location or guarding.

110.56 Energized Parts. Bare terminals of transformers, switches, motor controllers, and other equipment shall be enclosed to prevent accidental contact with energized parts.

110.57 Ventilation System Controls. Electrical controls for the ventilation system shall be arranged so that the airflow can be reversed.

Δ **110.58 Disconnecting Means.** A switch or circuit breaker that simultaneously opens all ungrounded conductors of the circuit shall be installed within sight of each transformer or motor location for disconnecting the transformer or motor. The switch or circuit breaker for a transformer shall have an ampere rating not less than the ampacity of the transformer supply conductors. The switch or circuit breaker for a motor shall comply with the applicable requirements of Article 430 Part IX.

110.59 Enclosures. Enclosures for use in tunnels shall be dripproof, weatherproof, or submersible as required by the environmental conditions. Switch or contactor enclosures shall not be used as junction boxes or as raceways for conductors feeding through or tapping off to other switches, unless the enclosures comply with 312.11.

Part V. Manholes and Other Electrical Enclosures Intended for Personnel Entry

110.70 General. Electrical enclosures intended for personnel entry and specifically fabricated for this purpose shall be of sufficient size to provide safe work space about electrical equipment with live parts that is likely to require examination, adjustment, servicing, or maintenance while energized. Such enclosures shall have sufficient size to permit ready installation or withdrawal of the conductors employed without damage to the conductors or to their insulation. They shall comply with this part.

Exception: Where electrical enclosures covered by Part V of this article are part of an industrial wiring system operating under conditions of maintenance and supervision that ensure that only qualified persons monitor and supervise the system, they shall be permitted to be designed and installed in accordance with appropriate engineering practice. If required by the authority having jurisdiction, design documentation shall be provided.

110.71 Strength. Manholes, vaults, and their means of access shall be designed under qualified engineering supervision and shall withstand all loads likely to be imposed on the structures.

Informational Note: See ANSI C2-2023, *National Electrical Safety Code,* for additional information on the loading that can be expected to bear on underground enclosures.

Δ **110.72 Cabling Work Space.** A clear work space not less than 900 mm (3 ft) wide shall be provided where cables are located on both sides, and not less than 750 mm (2½ ft) where cables are only on one side. The vertical headroom shall be not less than 1.8 m (6 ft) unless the opening is within 300 mm (1 ft), measured horizontally, of the adjacent interior side wall of the enclosure.

Exception: A manhole containing only one or more of the following shall be permitted to have one of the horizontal work space dimensions reduced to 600 mm (2 ft) where the other horizontal clear work space is increased so the sum of the two dimensions is not less than 1.8 m (6 ft):

(1) Optical fiber cables
(2) Power-limited fire alarm circuits supplied in accordance with 760.121
(3) Class 2 or Class 3 remote-control and signaling circuits, or both, supplied in accordance with 721.30
(4) Class 4 fault-managed power circuits supplied in accordance with 721.50

110.73 Equipment Work Space. Where electrical equipment with live parts that is likely to require examination, adjustment, servicing, or maintenance while energized is installed in a manhole, vault, or other enclosure designed for personnel access, the work space and associated requirements in 110.26 shall be met for installations operating at not over 1000 volts ac, 1500 volts dc, nominal. Where the installation is over 1000 volts ac, 1500 volts dc, nominal, the work space and associated requirements in 110.34 shall be met. A manhole access cover that weighs over 45.4 kg (100 lb) shall be considered as meeting the requirements of 110.26(F) and 110.34(C).

110.74 Conductor Installation. Conductors installed in manholes and other enclosures intended for personnel entry shall be cabled, racked up, or arranged in an approved manner that provides ready and safe access for persons to enter for installation and maintenance. The installation shall comply with 110.74(A) or 110.74(B), as applicable.

(A) Not Over 1000 Volts ac, 1500 Volts dc, Nominal. Wire bending space for conductors operating not over 1000 volts ac, 1500 volts dc, nominal, shall be provided in accordance with 314.28.

Δ **(B) Over 1000 Volts ac, 1500 Volts dc, Nominal.** Conductors operating at over 1000 volts ac, 1500 volts dc, nominal, shall be provided with bending space in accordance with 305.13(C), as applicable.

Exception: Where 305.13(C) applies, each row or column of ducts on one wall of the enclosure shall be calculated individually, and the single row or column that provides the maximum distance shall be used.

110.75 Access to Manholes.

Δ **(A) Dimensions.** Rectangular access openings shall not be less than 650 mm × 550 mm (26 in. × 22 in.). Round access openings in a manhole shall be not less than 650 mm (26 in.) in diameter.

Exception: A manhole that has a fixed ladder that does not obstruct the opening or that contains only one or more of the following shall be permitted to reduce the minimum cover diameter to 600 mm (2 ft):

(1) Optical fiber cables
(2) Power-limited fire alarm circuits supplied in accordance with 760.121
(3) Class 2 or Class 3 remote-control and signaling circuits, or both, supplied in accordance with 721.30
(4) Class 4 fault-managed power circuits supplied in accordance with 721.50

(B) Obstructions. Manhole openings shall be free of protrusions that could injure personnel or prevent ready egress.

(C) Location. Manhole openings for personnel shall be located where they are not directly above electrical equipment or conductors inside the manhole enclosure. Where this is not practicable, either a protective barrier or a fixed ladder shall be provided.

(D) Covers. Covers shall be over 45 kg (100 lb) or otherwise designed to require the use of tools to open. They shall be designed or restrained so they cannot fall into the manhole or protrude sufficiently to contact electrical conductors or equipment within the manhole.

(E) Marking. Manhole covers shall have an identifying mark or logo that prominently indicates their function, such as "electric."

110.76 Access to Vaults and Tunnels.

(A) Location. Access openings for personnel shall be located where they are not directly above electrical equipment or conductors in the enclosure. Other openings shall be permitted over equipment to facilitate installation, maintenance, or replacement of equipment.

(B) Locks. In addition to compliance with the requirements of 110.34, if applicable, access openings for personnel shall be arranged such that a person on the inside can exit when the access door is locked from the outside, or in the case of normally locking by padlock, the locking arrangement shall be such that the padlock can be closed on the locking system to prevent locking from the outside.

110.77 Ventilation. Where manholes, tunnels, and vaults have communicating openings into enclosed areas used by the public, ventilation to open air shall be provided wherever practicable.

110.78 Guarding. Where conductors or equipment, or both, could be contacted by objects falling or being pushed through a ventilating grating, both conductors and live parts shall be protected in accordance with the requirements of 110.27(A)(2) or 110.31(B)(1), depending on the voltage.

110.79 Fixed Ladders. Fixed ladders shall be corrosion resistant.

N

ARTICLE 120
Branch-Circuit, Feeder, and Service Load Calculations

N **Part I. General**

N **120.1 Scope.** This article provides requirements for calculating branch-circuit, feeder, and service loads. Part I provides general requirements for calculation methods. Part II provides calculation methods for branch-circuit loads. Part III and Part IV provide calculation methods for feeder and service loads. Part V provides calculation methods for farm loads. Part VI provides calculation methods for health care facilities. Part VII provides calculation methods for marinas, boatyards, floating buildings, and docking facilities. Part VIII provides calculation methods for recreational vehicle parks.

Informational Note No. 1: See Informative Annex D for examples.

Informational Note No. 2: See Figure Informational Note 120.1 for information on the organization of this article.

N **120.4 Other Articles for Specific-Purpose Calculations.** Table 120.4 shall provide references for specific-purpose calculation requirements not located in Chapters 5, 6, or 7 that amend or supplement the requirements of this article.

N **120.5 Calculations.**

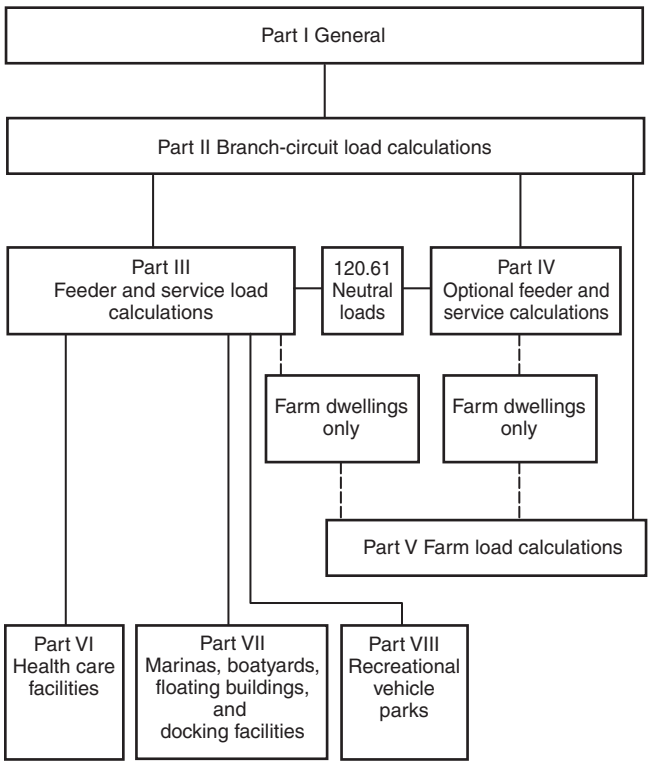
N **(A) Voltages.** Unless other voltages are specified, for purposes of calculating branch-circuit and feeder loads, nominal system voltages of 120, 120/240, 208Y/120, 240, 347, 416Y/240, 480Y/277, 480, 600Y/347, and 600 volts shall be used.

Informational Note: Direct-current (dc) electrical systems are often described with a nominal voltage and a wide voltage band. For dc electrical systems with a wide voltage band, both the upper and lower limits of the bands are important considerations for load calculations.

N **(B) Fractions of an Ampere.** Load calculations shall be permitted to be rounded to the nearest whole ampere, with decimal fractions smaller than 0.5 dropped.

N **(C) Floor Area.** The floor area for each floor shall be calculated from the outside dimensions of the building, dwelling unit, or other area involved. For dwelling units, the calculated floor area shall not include detached garages, open porches, or unfinished areas not adaptable for future use as a habitable room or occupiable space.

N **(D) Direct-Current (dc) Loads.** For dc equipment, volt-amperes (VA) shall be considered equivalent to watts (W), and kilovolt-amperes (kVA) shall be considered equivalent to kilowatts (kW), for loads calculated in Article 120.



N FIGURE Informational Note 120.1 Branch-Circuit, Feeder, and Service Load Calculation Methods.

N Table 120.4 Specific-Purpose Calculation References

Calculation	Article	Section (or Part)
Air-conditioning and refrigerating equipment, branch-circuit conductor sizing	440	Part IV
Capacitors	460	460.8
Fixed electric heating equipment for pipelines and vessels, branch-circuit sizing	427	427.4
Fixed electric space-heating equipment, branch-circuit sizing	424	424.5
Fixed outdoor electric deicing and snow-melting equipment, branch-circuit sizing	426	426.4
Fixed resistance and electrode industrial process heating equipment	425	425.4
Motors, feeder demand factor	430	430.26
Motors, multimotor and combination-load equipment	430	430.25
Motors, several motors or a motor(s) and other load(s)	430	430.24
Over 1000-volt ac and 1500-volt dc branch-circuit calculations	265	265.19
Over 1000-volt feeder calculations	215	236.4
Phase converters, conductors	455	455.6
Storage-type water heaters	422	422.13

N (E) Percent Multiplier. Load calculations shall not require continuous loads to be calculated at 125 percent.

Informational Note: A 125-percent multiplier could be required for reasons other than continuous load. Continuous loads impact the sizing of the conductor and OCPD but might not influence the load.

N 120.6 Noncoincident Loads. For two or more noncoincident loads, it shall be permitted to use the single largest of these loads in the calculation of the total load. Determination of the largest noncoincident load shall include treatment of any motor-operated and combination loads as specified in 120.11(A). Noncoincident loads shall be considered to be one of the following:

(1) For feeders or services: Two or more loads that are unlikely to be in use simultaneously
(2) For branchcircuits, feeders, or services: Two or more loads that are prevented from being in use simultaneously by listed equipment

N 120.7 Power Control System (PCS). PCSs shall be permitted to be used for branch-circuit, feeder, or service load calculations. When used in load calculations, the installation shall comply with 120.7(A) through 120.7(C).

N (A) PCS Requirements. The PCS shall comply with Article 130 Part II.

N (B) PCS Control Setting. The PCS control setting shall be determined by qualified persons and be set to no greater than 80 percent of the rating of the OCPD for the circuit being monitored by the PCS to provide overload control.

N (C) Load Calculations Using PCS. The load on the branch circuit, feeder, or service shall be the sum of the controlled loads, as determined in 120.7(C)(1), and noncontrolled loads, as determined in 120.7(C)(2).

N (1) Controlled Loads. Controlled loads shall be based on the monitoring by the PCS to provide overload control and the PCS control configuration and shall comply with one or both of the following:

(1) If the PCS monitors only controlled loads, the control setting of the PCS shall be used in place of the controlled loads in load calculations.
(2) If the PCS monitors both controlled and noncontrolled loads, the minimum operating current of the controlled loads shall be used in place of the controlled loads in load calculations.

Informational Note: Minimum operating current is a value greater than or equal to zero representing the minimum current of the controlled loads.

N (2) Noncontrolled Loads. Load calculations for loads not controlled by the PCS shall comply with Article 120 Parts II through VII.

Informational Note: See Informative Annex D Examples D14(a) through D14(d) for examples of load calculations with loads managed by PCSs.

N Part II. Branch-Circuit Load Calculations

N 120.10 General. Branch-circuit loads shall be calculated in accordance with the following sections:

(1) 120.14 for other loads — all occupancies

(2) 120.16 for additions to existing installations
(3) 120.13 for dwelling units
(4) 120.42 for lighting loads for non-dwelling occupancies
(5) 120.44 for hotel and motel occupancies

N **120.11 Maximum Load.** The total load on a branch circuit shall not exceed the rating of the branch circuit nor the maximum loads specified in 120.11(A) through 120.11(C) under the conditions specified therein.

N **(A) Motor-Operated and Combination Loads.** Where a circuit supplies only motor-operated loads, the conductor sizing requirement specified in 430.22 shall apply. Where a circuit supplies only air-conditioning equipment, refrigerating equipment, or both, the requirements of 440.6 shall apply. For circuits supplying loads consisting of motor-operated utilization equipment that is fastened in place and has a motor larger than ⅛ hp in combination with other loads, the total calculated load shall be not less than 125 percent of the largest motor load plus the sum of the other loads in accordance with 430.24.

N **(B) Lighting Loads.** For circuits supplying lighting units that have ballasts, transformers, autotransformers, or LED drivers, the calculated load shall be based on the total ampere ratings of such units and not on the total watts of the lamps.

N **(C) Electric Cooking Appliances.** Applying demand factors for ranges, wall-mounted ovens, counter-mounted cooking units, and other household cooking appliance loads in excess of 1¾ kW shall be permitted in accordance with Table 120.55, including Notes 4, 5, and 6.

N **120.13 Dwelling Units – Branch-Circuit Loads.** In dwelling units, the minimum unit load shall be not less than 33 volt-amperes/m^2 (3 volt-amperes/ft^2) for calculating minimum branch circuits required.

N **120.14 Other Loads — All Occupancies.** Branch-circuit load calculations shall include calculation of a minimum load on each outlet as calculated in 120.14(A) through 120.14(K) and then summed to establish the load on the branch circuit.

In all occupancies, the minimum load for each outlet for general-use receptacles and outlets not used for general illumination shall not be less than that calculated in 120.14(A) through 120.14(K), with the loads shown being based on nominal branch-circuit voltages.

Exception: The loads of outlets serving switchboards and switching frames in telephone exchanges shall be waived from the calculations.

N **(A) Specific Appliances or Loads.** An outlet for a specific appliance or other load not covered in 120.14(B) through 120.14(K) shall be calculated based on the ampere rating of the appliance or load served.

N **(B) Electric Dryers and Electric Cooking Appliances in Dwellings and Household Cooking Appliances Used in Instructional Programs.** Load calculations shall be permitted as specified in 120.55 for electric ranges and other cooking appliances. The branch-circuit load for electric dryers shall be calculated using 5000 watts (volt-amperes) or the nameplate rating, whichever is greater for each dryer served.

N **(C) Motor Outlets.** The conductor sizing requirements specified in 430.22, 430.24, and 440.6 shall be used to determine the loads for motor outlets.

N **(D) Luminaires.** An outlet supplying a luminaire(s) shall be calculated at not less than the maximum volt-ampere rating of the equipment and lamps for which the luminaire(s) is rated.

N **(E) Heavy-Duty Lampholders.** Outlets for heavy-duty lampholders shall be calculated at a minimum of 600 volt-amperes.

N **(F) Sign and Outline Lighting.** Sign and outline lighting outlets shall be calculated at a minimum of 1200 volt-amperes for each required branch circuit specified in 600.5(A).

N **(G) Show Windows.** Show windows shall be calculated in accordance with either of the following:

(1) The unit load per outlet as required in other provisions of this section
(2) At 200 volt-amperes per linear 300 mm (1 ft) of show window

N **(H) Fixed Multioutlet Assemblies.** Fixed multioutlet assemblies used in other than dwelling units or the guest rooms or guest suites of hotels or motels shall be calculated in accordance with all of the following:

(1) Where utilization equipment is unlikely to be used simultaneously, each 1.5 m (5 ft) or fraction thereof of each separate and continuous length shall be considered as one outlet of not less than 180 volt-amperes.
(2) Where utilization equipment is likely to be used simultaneously, each 300 mm (1 ft) or fraction thereof shall be considered as an outlet of not less than 180 volt-amperes.

For the purposes of this section, the calculation shall be permitted to be based on the portion that contains receptacles.

N **(I) Receptacle Outlets.** Except as covered in 120.41 and 120.14(J), receptacle outlets shall be calculated at not less than 180 volt-amperes for each single or for each multiple receptacle on one yoke. A single piece of equipment consisting of a multiple receptacle comprised of four or more receptacles shall be calculated at not less than 90 volt-amperes per receptacle. This provision shall not be applicable to the receptacle outlets specified in 210.11(C)(1) and 210.11(C)(2).

N **(J) Receptacle Outlets in Office Buildings.** In office buildings, the receptacle loads shall be calculated to be the larger of the following:

(1) The calculated load from 120.14(I)
(2) 11 volt-amperes/m^2 (1 volt-ampere/ft^2)

N **(K) Other Outlets.** Other outlets not covered in 120.14(A) through 120.14(J) shall be calculated at not less than 180 volt-amperes per outlet.

N **120.16 Loads for Additions to Existing Installations.**

N **(A) Dwelling Units.** Loads added to an existing dwelling unit(s) shall be calculated in accordance with 120.14.

N **(B) Other Than Dwelling Units.** Loads for new circuits or extended circuits in other than dwelling units shall be calculated in accordance with either 120.42 or 120.14, as applicable.

N Part III. Feeder and Service Load Calculations

N **120.40 General.** The calculated load of a feeder or service shall not be less than the sum of the loads on the branch circuits supplied, as determined by Article 120 Part II, after any

applicable demand factors permitted or required by Article 120 Part III, IV, V, VI, or VII have been applied.

Informational Note No. 1: See Informative Annex D Examples D1(a) through D10 for examples of feeder and service load calculations.

Informational Note No. 2: See 120.11(B) for the maximum load in amperes permitted for lighting units operating at less than 100 percent power factor.

N 120.41 Dwelling Units, Minimum Unit Load. In one-family, two-family, and multifamily dwellings, the minimum unit load shall be not less than 22 volt-amperes/m^2 (2 volt-amperes/ft^2).

Unit loads include the following lighting and receptacle outlets, and no additional load calculations shall be required:

(1) All general-use receptacle outlets of 20-ampere rating or less, including receptacles connected to the circuits specified in 210.11(C)(3) and 210.11(C)(4)
(2) The receptacle outlets specified in 210.52(E) and 210.52(G)
(3) The lighting outlets specified in 210.70

The minimum lighting load shall be determined using the minimum unit load and the floor area as determined in 120.5(C) for dwelling occupancies. Motors rated less than ⅛ hp and connected to a lighting circuit shall be considered part of the minimum lighting load.

N 120.42 Lighting Load for Non-Dwelling Occupancies.

N (A) General. A unit load of not less than that specified in Table 120.42(A) for non-dwelling occupancies and the floor area determined in 120.5(C) shall be used to calculate the minimum lighting load. Motors rated less than ⅛ HP and connected to a lighting circuit shall be considered general lighting load.

Informational Note: The unit values of Table 120.42(A) are based on minimum load conditions and 80 percent power factor and might not provide sufficient capacity for the installation contemplated.

N (B) Energy Code. Where the building is designed and constructed to comply with an energy code adopted by the local authority, the lighting load shall be permitted to be calculated using the unit values specified in the energy code where the following conditions are met:

(1) A power monitoring system is installed that will provide continuous information regarding the total general lighting load of the building.
(2) The power monitoring system will be set with alarm values to alert the building owner or manager if the lighting load exceeds the values set by the energy code. Automatic means to take action to reduce the connected load shall be permitted.
(3) The demand factors specified in 120.45 are not applied to the general lighting load.
(4) The continuous load multiplier of 125 percent shall be applied.

N 120.43 Office Buildings. In office buildings, the receptacle loads shall be calculated to be the larger of the following:

(1) The calculated load from 120.14(I) after Table 120.47 demand factors have been applied
(2) 11 volt-amperes/m^2 or 1 volt-ampere/ft^2

N Table 120.42(A) General Lighting Loads by Non-Dwelling Occupancy

	Unit Load	
Type of Occupancy	Volt-amperes/m^2	Volt-amperes/ft^2
Automotive facility	16	1.5
Convention center	15	1.4
Courthouse	15	1.4
Dormitory	16	1.5
Exercise center	15	1.4
Fire station	14	1.3
Gymnasium[1]	18	1.7
Health care clinic	17	1.6
Hospital	17	1.6
Hotel or motel, or apartment house without provisions for cooking by tenants[2]	18	1.7
Library	16	1.5
Manufacturing facility[3]	24	2.2
Motion picture theater	17	1.6
Museum	17	1.6
Office[4]	14	1.3
Parking garage[5]	3	0.3
Penitentiary	13	1.2
Performing arts theater	16	1.5
Police station	14	1.3
Post office	17	1.6
Religious facility	24	2.2
Restaurant[6]	16	1.5
Retail[7, 8]	20	1.9
School/university	16	1.5
Sports arena	16	1.5
Town hall	15	1.4
Transportation	13	1.2
Warehouse	13	1.2
Workshop	18	1.7

[1]Armories and auditoriums are considered gymnasium-type occupancies.
[2]Lodge rooms are similar to hotels and motels.
[3]Industrial commercial loft buildings are considered manufacturing-type occupancies.
[4]Banks are office-type occupancies.
[5]Commercial (storage) garages are considered parking garage occupancies.
[6]Clubs are considered restaurant occupancies.
[7]Barber shops and beauty parlors are considered retail occupancies.
[8]Stores are considered retail occupancies.

N 120.44 Hotel and Motel Occupancies. In guest rooms or guest suites of hotels and motels, the following lighting and receptacle outlets are included in the minimum unit load in Table 120.42(A), and no additional load calculations shall be required for such outlets:

(1) All general-use receptacle outlets of 20-ampere rating or less, including receptacles connected to the circuits in 210.11(C)(3) and 210.11(C)(4)
(2) The receptacle outlets specified in 210.52(E)(3)
(3) The lighting outlets specified in 210.70

N 120.45 General Lighting. The demand factors specified in Table 120.45 shall apply to that portion of the total branch-circuit load calculated for general illumination. They shall not

be applied in determining the number of branch circuits for general illumination.

N 120.46 Show-Window and Track Lighting.

N (A) Show Windows. For show-window lighting, a load of not less than 660 volt-amperes/linear meter or 200 volt-amperes/linear foot shall be included for a show window, measured horizontally along its base.

Informational Note: See 120.14(G) for branch circuits supplying show windows.

N (B) Track Lighting. For track lighting in other than dwelling units or guest rooms or guest suites of hotels or motels, an additional load of 150 volt-amperes shall be included for every 600 mm (2 ft) of lighting track or fraction thereof. Where multicircuit track is installed, the load shall be considered to be divided equally between the track circuits.

Exception: If the track lighting is supplied through a device that limits the current to the track, the load shall be permitted to be calculated based on the rating of the device used to limit the current.

N 120.47 Receptacle Loads — Other Than Dwelling Units. Receptacle loads calculated in accordance with 120.14(H) and 120.14(I) shall be permitted to be made subject to the demand factors given in Table 120.45 or Table 120.47.

N 120.50 Motors and Air-Conditioning Equipment.

N (A) Motors. The conductor sizing requirements specified in 430.24 and 430.25 and the feeder demand factor calculation method specified in 430.26 shall be used to determine motor loads.

N Table 120.45 Lighting Load Demand Factors

Type of Occupancy	Portion of Lighting Load to Which Demand Factor Applies (Volt-Amperes)	Demand Factor (%)
Dwelling units	First 3000 at	100
	From 3001 to 120,000 at	35
	Remainder over 120,000 at	25
Hotels and motels, including apartment houses without provision for cooking by tenants*	First 20,000 or less at	60
	From 20,001 to 100,000 at	50
	Remainder over 100,000 at	35
Warehouses (storage)	First 12,500 or less at	100
	Remainder over 12,500 at	50
All others	Total volt-amperes	100

*The demand factors of this table shall not apply to the calculated load of feeders or services supplying areas in hotels and motels where the entire lighting is likely to be used at one time, as in ballrooms or dining rooms.

N Table 120.47 Demand Factors for Non-Dwelling Receptacle Loads

Portion of Receptacle Load to Which Demand Factor Applies (Volt-Amperes)	Demand Factor (%)
First 10 kVA or less at	100
Remainder over 10 kVA at	50

N (B) Air-Conditioning Equipment. The conductor sizing requirements specified in Article 440 Part IV shall be used to determine air-conditioning loads for hermetic refrigerant motor-compressors.

N 120.51 Fixed Electric Space Heating. Fixed electric space-heating loads shall be calculated at 100 percent of the total connected load. However, in no case shall a feeder or service load current rating be less than the rating of the largest branch circuit supplied.

Exception: If reduced loading of the conductors results from units operating on duty-cycleor intermittently, or from all units not operating at the same time, the authority having jurisdiction shall be permitted to grant permission for feeder and service conductors to have an ampacity less than 100 percent if the conductors have an ampacity for the load so determined.

N 120.52 Small-Appliance and Laundry Loads — Dwelling Unit.

N (A) Small-Appliance Circuit Load. In each dwelling unit, the load shall be calculated at 1500 volt-amperes for each 2-wire small-appliance branch circuit as covered by 210.11(C)(1). Where the load is subdivided through two or more feeders, the calculated load for each shall include not less than 1500 volt-amperes for each 2-wire small-appliance branch circuit. These loads shall be permitted to be included with the general lighting load and subjected to the demand factors provided in Table 120.45.

Exception: The individual branch circuit permitted by 210.52(B)(1) Exception No. 2 shall be permitted to be excluded from the calculation required by 120.52.

N (B) Laundry Circuit Load. A load of not less than 1500 volt-amperes shall be included for each 2-wire laundry branch circuit installed as covered by 210.11(C)(2). This load shall be permitted to be included with the general lighting load and shall be subjected to the demand factors provided in Table 120.45.

N 120.53 Appliance Load — Dwelling Unit(s). Applying a demand factor of 75 percent to the nameplate rating load of four or more appliances rated ¼ hp or greater, or 500 watts or greater, that are fastened in place, and that are served by the same feeder or service in a one-family, two-family, or multifamily dwelling shall be permitted. This demand factor shall not apply to the following:

(1) Household electric cooking equipment that is fastened in place
(2) Clothes dryers
(3) Space heating equipment
(4) Air-conditioning equipment
(5) Electric vehicle supply equipment (EVSE)

N 120.54 Electric Clothes Dryers — Dwelling Unit(s). The load for household electric clothes dryers in a dwelling unit(s) shall be the nameplate rating if available or 5000 watts (volt-amperes), whichever is larger, for each dryer served. The use of the demand factors in Table 120.54 shall be permitted. Where two or more single-phase dryers are supplied by a 3-phase, 4-wire feeder or service, the total load shall be calculated on the basis of twice the maximum number connected between any two phases. Kilovolt-amperes (kVA) shall be considered equivalent to kilowatts (kW) for loads calculated in this section.

N 120.55 Electric Cooking Appliances in Dwelling Units and Household Cooking Appliances Used in Instructional Programs. The load for household electric ranges, wall-mounted ovens, counter-mounted cooking units, and other household cooking appliances individually rated in excess of 1¾ kW shall be permitted to be calculated in accordance with Table 120.55. Kilovolt-amperes (kVA) shall be considered equivalent to kilowatts (kW) for loads calculated under this section.

Where two or more single-phase ranges are supplied by a 3-phase, 4-wire feeder or service, the total load shall be calculated on the basis of twice the maximum number connected between any two phases.

Informational Note No. 1: See Informative Annex D for examples.

Informational Note No. 2: See Table 120.56 for demand factors for commercial cooking equipment.

N 120.56 Instantaneous Water Heaters and Kitchen Equipment — Other Than Dwelling Unit(s). Calculating the load for instantaneous water heaters and commercial electric cooking equipment, dishwasher booster heaters, water heaters, and other kitchen equipment in accordance with Table 120.56 shall be permitted. Other kitchen equipment shall include equipment that is fastened in place and rated ¼ hp or greater, or 500 watts or greater. These demand factors shall be applied to all instantaneous water heaters or equipment that has either thermostatic control or intermittent use as kitchen equipment. These demand factors shall not apply to space-heating, ventilating, or air-conditioning equipment.

However, in no case shall the feeder or service calculated load be less than the sum of the largest two kitchen equipment loads.

N 120.57 Electric Vehicle Supply Equipment (EVSE) Load. For each EVSE served, the load shall be calculated at the nameplate rating of the equipment, if available, or at 7200 watts (volt-amperes) if the nameplate is not available.

N 120.61 Feeder or Service Neutral Load.

N (A) Basic Calculation. The feeder or service neutral load shall be the maximum unbalance of the load determined by this article. The maximum unbalanced load shall be the maximum net calculated load between the neutral conductor and any one ungrounded conductor.

Exception: For 3-wire, 2-phase or 5-wire, 2-phase systems, the maximum unbalanced load shall be the maximum net calculated load between the neutral conductor and any one ungrounded conductor multiplied by 140 percent.

N (B) Permitted Reductions. A service or feeder supplying the following loads shall be permitted in accordance with 120.61(B)(1) and 120.61(B)(2).

N (1) Household Electric Ranges, Wall-Mounted Ovens, Counter-Mounted Cooking Units, and Dryers. A demand factor of 70 percent shall be permitted to be applied to the portion of the feeder or service supplying household electric ranges, wall-mounted ovens, counter-mounted cooking units, and electric dryers where the maximum unbalanced load has been determined in accordance with Table 120.55 for ranges and Table 120.54 for dryers.

N (2) Unbalanced Load in Excess of 200 Amperes. A demand factor of 70 percent shall be permitted to be applied to the portion of the unbalanced load in excess of 200 amperes where the feeder or service is supplied from a 3-wire dc or single-phase ac system; a 4-wire, 3-phase system; a 3-wire, 2-phase system; or a 5-wire, 2-phase system.

Informational Note: See Informative Annex D Examples D1(a), D1(b), D2(b), D4(a), and D5(a) for examples of unbalanced feeder or service neutral loads.

N (C) Prohibited Reductions. There shall be no reduction of the neutral or grounded conductor capacity applied to the amount in 120.61(C)(1), or portion of the amount in 120.61(C)(2), from that determined by the basic calculation:

(1) Any portion of a 3-wire circuit consisting of 2 ungrounded conductors and the neutral conductor of a 4-wire, 3-phase, wye-connected system
(2) That portion consisting of nonlinear loads supplied from a 4-wire, wye-connected, 3-phase system

Informational Note: A 3-phase, 4-wire, wye-connected power system used to supply power to nonlinear loads might necessitate that the power system design allows for the possibility of high harmonic neutral conductor currents.

N Table 120.54 Demand Factors for Household Electric Clothes Dryers

Number of Dryers	Demand Factor (%)
1–2	100
3–5	80
6	75
7	65
8	60
9	55
10	50
11	47
12–23	47% minus 1% for each dryer exceeding 11
24–42	35% minus 0.5% for each dryer exceeding 23
43 and over	25%

N Part IV. Optional Feeder and Service Load Calculations

N 120.80 General. Optional feeder and service load calculations shall be permitted in accordance with Article 120 Part IV.

N 120.82 Dwelling Unit.

N (A) Feeder and Service Load. This section applies to a dwelling unit having the total connected load served by a single 120/240-volt or 208Y/120-volt set of 3-wire service or feeder conductors with an ampacity of 100 or greater. It shall be permissible to calculate the feeder and service loads in accordance with this section instead of the method specified in Article 120 Part III. The calculated load shall be the result of adding the loads from 120.82(B), 120.82(C), and 120.82(D). Feeder and service-entrance conductors whose calculated load is determined by this optional calculation shall be permitted to have the neutral load determined by 120.61.

N **Table 120.55 Demand Factors and Loads for Household Electric Ranges, Wall-Mounted Ovens, Counter-Mounted Cooking Units, and Other Household Cooking Appliances over 1¾ kW Rating (Column C to be used in all cases except as otherwise permitted in Note 3.)**

Number of Appliances	Demand Factor (%) (See Notes)		Column C Maximum Demand (kW) (See Notes) (Not over 12 kW Rating)
	Column A (Less than 3½ kW Rating)	Column B (3½ kW through 8¾ kW Rating)	
1	80	80	8
2	75	65	11
3	70	55	14
4	66	50	17
5	62	45	20
6	59	43	21
7	56	40	22
8	53	36	23
9	51	35	24
10	49	34	25
11	47	32	26
12	45	32	27
13	43	32	28
14	41	32	29
15	40	32	30
16	39	28	31
17	38	28	32
18	37	28	33
19	36	28	34
20	35	28	35
21	34	26	36
22	33	26	37
23	32	26	38
24	31	26	39
25	30	26	40
26–30	30	24	15 kW + 1 kW for each range
31–40	30	22	
41–50	30	20	25 kW + ¾ kW for each range
51–60	30	18	
61 and over	30	16	

Notes:

1. *Over 12 kW through 27 kW ranges all of same rating.* For ranges individually rated more than 12 kW but not more than 27 kW, the maximum demand in Column C shall be increased 5 percent for each additional kilowatt of rating or major fraction thereof by which the rating of individual ranges exceeds 12 kW.
2. *Over 8¾ kW through 27 kW ranges of unequal ratings.* For ranges individually rated more than 8¾ kW and of different ratings, but none exceeding 27 kW, an average value of rating shall be calculated by adding together the ratings of all ranges to obtain the total connected load (using 12 kW for any range rated less than 12 kW) and dividing by the total number of ranges. Then the maximum demand in Column C shall be increased 5 percent for each kilowatt or major fraction thereof by which this average value exceeds 12 kW.
3. *Over 1¾ kW through 8¾ kW.* In lieu of the method provided in Column C, adding the nameplate ratings of all household cooking appliances rated more than 1¾ kW but not more than 8¾ kW and multiplying the sum by the demand factors specified in Column A or Column B for the given number of appliances shall be permitted. Where the rating of cooking appliances falls under both Column A and Column B, the demand factors for each column shall be applied to the appliances for that column, and the results added together.
4. Calculating the branch-circuit load for one range in accordance with Table 220.55 shall be permitted.
5. The branch-circuit load for one wall-mounted oven or one counter-mounted cooking unit shall be the nameplate rating of the appliance.
6. The branch-circuit load for a counter-mounted cooking unit and not more than two wall-mounted ovens, all supplied from a single branch circuit and located in the same room, shall be calculated by adding the nameplate rating of the individual appliances and treating this total as equivalent to one range.
7. This table shall also apply to household cooking appliances rated over 1¾ kW and used in instructional programs.

N Table 120.56 Demand Factors for Instantaneous Water Heaters and Kitchen Equipment — Other Than Dwelling Unit(s)

Number of Units of Equipment	Demand Factor (%)
1	100
2	100
3	90
4	80
5	70
6 and over	65

N (B) General Loads. The general calculated load shall be not less than 100 percent of the first 8 kVA plus 40 percent of the remainder of the following loads:

(1) 22 volt-amperes/m^2 or 2 volt-amperes/ft^2 for general lighting and general-use receptacles. The floor area is determined in accordance with 120.5(C).
(2) 1500 volt-amperes for each 2-wire, 20-ampere small-appliance branch circuit and each laundry branch circuit covered in 210.11(C)(1) and 210.11(C)(2).
(3) The nameplate rating of the following:
   a. All appliances that are fastened in place, permanently connected, or located to be on a specific circuit
   b. Ranges, wall-mounted ovens, counter-mounted cooking units
   c. Clothes dryers that are not connected to the laundry branch circuit specified in 120.82(B)(2)
   d. Water heaters
(4) The nameplate ampere or kVA rating of all permanently connected motors not included in 120.82(B)(3).

N (C) Heating and Air-Conditioning Load. The largest of the following six selections (load in kVA) shall be included:

(1) 100 percent of the nameplate rating(s) of the air conditioning and cooling.
(2) 100 percent of the nameplate rating(s) of the heat pump when the heat pump is used without any supplemental electric heating.
(3) 100 percent of the nameplate rating(s) of the heat pump compressor and 65 percent of the supplemental electric heating for central electric space-heating systems. If the heat pump compressor is prevented from operating at the same time as the supplementary heat, it does not need to be added to the supplementary heat for the total central space heating load.
(4) 65 percent of the nameplate rating(s) of electric space heating if less than four separately controlled units.
(5) 40 percent of the nameplate rating(s) of electric space heating if four or more separately controlled units.
(6) 100 percent of the nameplate ratings of electric thermal storage and other heating systems where the usual load is expected to be continuous at the full nameplate value. Systems qualifying under this selection shall not be calculated under any other selection in 120.82(C).

N (D) EVSE Loads. The total load of an EVSE shall be calculated at 100 percent in accordance with 120.57.

N 120.83 Existing Dwelling Unit. This section shall be permitted to be used to determine if the existing service or feeder is of sufficient capacity to serve additional loads if the dwelling unit is served by a 120/240-volt or 208Y/120-volt, 3-wire service or feeder. The percentages listed in Table 120.83 shall be used for existing and additional new loads. The larger connected load of air conditioning or space heating, but not both, shall be used.

Load calculations shall include all of the following:

(1) General lighting and general-use receptacles at 22 volt-amperes/m^2 or 2 volt-amperes/ft^2
(2) 1500 volt-amperes for each 2-wire, 20-ampere small-appliance branch circuit and each laundry branch circuit covered in 210.11(C)(1) and 210.11(C)(2)
(3) The nameplate ratings of all of the following equipment that are not connected to the branch circuits addressed in 120.83(1) or 120.83(2):
   a. All appliances that are fastened in place, permanently connected, or located to be on a specific circuit
   b. Ranges, wall-mounted ovens, and counter-mounted cooking units
   c. Clothes dryers
   d. Water heaters
   e. EVSEs supplied by individual branch circuits

N 120.84 Multifamily Dwelling.

N (A) Feeder or Service Load. The load of a feeder or service that supplies three or more dwelling units of a multifamily dwelling shall be permitted to be calculated in accordance with 120.84(A)(1) or 120.84(A)(2).

N (1) Conditions. The load shall be permitted to be calculated in accordance with Table 120.84(C) instead of Article 120 Part III if all of the following conditions are met:

(1) No dwelling unit is supplied by more than one feeder.
(2) Each dwelling unit is equipped with electric cooking equipment.

Exception: When the calculated load for multifamily dwellings without electric cooking in Article 120 Part III exceeds that calculated under Article 120 Part IV for the identical load plus electric cooking (based on 8 kW per unit), the lesser of the two loads shall be permitted to be used.

(3) Each dwelling unit is equipped with electric space heating, air conditioning, or both. Feeders and service conductors whose load is determined by this optional calculation shall be permitted to have the neutral load determined by 120.61.

N (2) Total Demand. If all of the conditions of 120.84(A)(1) are met and if three or more single-phase 120/208-volt dwelling units are supplied by a 3-phase, 4-wire feeder or service, the total demand load shall be calculated on the basis of twice the maximum number connected between any two phases.

N Table 120.83 Existing Dwelling Unit Load Percentages

Load (kVA)	Percent of Load
First 8 kVA of existing and new load	100
Remainder of existing load	40
New EVSE	80
New central electric resistance space heating	80
All other new loads	50

N **(B) House Loads.** House loads shall be calculated in accordance with Article 120 Part III in addition to the dwelling unit loads calculated in accordance with 120.84(C).

N **(C) Calculated Loads.** The calculated load to which the demand factors of Table 120.84(C) apply shall include all of the following:

(1) 22 volt-amperes/m^2 or 2 volt-amperes/ft^2 for general lighting and general-use receptacles
(2) 1500 volt-amperes for each 2-wire, 20-ampere small-appliance branch circuit and each laundry branch circuit covered in 210.11(C)(1) and 210.11(C)(2)
(3) The nameplate ratings of all of the following:
   a. All appliances that are fastened in place, permanently connected, or located on a specific circuit
   b. Ranges, wall-mounted ovens, and counter-mounted cooking units
   c. Clothes dryers that are not connected to the laundry branch circuit specified in 120.84(C)(2)
   d. Water heaters
(4) The nameplate ampere or kVA rating of all permanently connected motors not included in 120.84(C)(3)
(5) The larger of the air-conditioning load or the fixed electric space-heating load

N **120.85 Two Dwelling Units.** Where two dwelling units are supplied by a single feeder or service and the calculated load under Article 120 Part III exceeds that for three identical units calculated under 120.84, the lesser of the two loads shall be permitted to be used.

N **120.86 Schools.** The calculation of a feeder or service load for schools shall be permitted in accordance with Table 120.86 in lieu of Article 120 Part III where equipped with electric space heating, air conditioning, or both. The connected load to which the demand factors of Table 120.86 apply shall include all of the interior and exterior lighting, power, water heating, cooking, other loads, and the larger of the air-conditioning load or space-heating load within the building or structure.

Feeders and service conductors whose calculated load is determined by this optional calculation shall be permitted to have the neutral load determined by 120.61. Where the building or structure load is calculated by this optional method, feeders within the building or structure shall have ampacity as permitted in Article 120 Part III; however, the ampacity of an individual feeder shall not be required to be larger than the ampacity for the entire building.

This section shall not apply to portable classroom buildings.

N **120.87 Determining Existing Loads.** The calculation of a feeder or service load for existing installations shall be permitted to use actual maximum demand to determine the existing load under all of the following conditions:

(1) The maximum demand data is available for a 1-year period.

Exception: If the maximum demand data for a 1-year period is not available, the calculated load shall be permitted to be based on the maximum demand (the highest average kilowatts reached and maintained for a 15-minute interval) continuously recorded over a minimum 30-day period using a recording ammeter or power meter connected to the highest loaded phase of the feeder or service, based on the initial loading at the start of the recording. The recording shall reflect the maximum demand of the feeder or service by being taken when the building or space is occupied and include, by measurement or calculation, the larger of the heating or cooling equipment load and other loads that might be periodic in nature due to seasonal or similar conditions. This exception shall not be permitted if the feeder or service has a renewable energy system (i.e., solar photovoltaic or wind electric) or employs any form of peak load shaving.

(2) The maximum demand at 125 percent plus the new load minus any removed load determined in accordance with Article 120 Parts I, III, and IV does not exceed the ampacity of the feeder or rating of the service.
(3) The feeder has overcurrent protection in accordance with 240.4, and the service has overload protection in accordance with 230.90.

N **120.88 New Restaurants.** Calculation of a service or feeder load, where the feeder serves the total load, for a new restaurant shall be permitted in accordance with Table 120.88 in lieu of Article 120 Part III.

N **Table 120.84(C) Optional Calculations — Demand Factors for Three or More Multifamily Dwelling Units**

Number of Dwelling Units	Demand Factor (%)
3–5	45
6–7	44
8–10	43
11	42
12–13	41
14–15	40
16–17	39
18–20	38
21	37
22–23	36
24–25	35
26–27	34
28–30	33
31	32
32–33	31
34–36	30
37–38	29
39–42	28
43–45	27
46–50	26
51–55	25
56–61	24
62 and over	23

N **Table 120.86 Optional Method — Demand Factors for Feeders and Service Conductors for Schools**

Connected Load		Demand Factor (%)	Calculated Loads (VA)
Total VA/m^2	Total VA/ft^2		
0–33	0–3	100	Amount × 100%
Over 33–220	Over 3–20	75	(Amount × 75%) + 3
Remainder over 220	Remainder over 20	25	(Amount × 25%) + 15.75

N Table 120.88 Optional Method — Permitted Load Calculations for Service and Feeder Conductors for New Restaurants

	All Electric Restaurant	Not All Electric Restaurant
Total Connected Load (kVA)	Calculated Loads (kVA)	Calculated Loads (kVA)
0–200	80%	100%
201–325	10% (amount over 200) + 160.0	50% (amount over 200) + 200.0
326–800	50% (amount over 325) + 172.5	45% (amount over 325) + 262.5
Over 800	50% (amount over 800) + 410.0	20% (amount over 800) + 476.3

Note: Add all electrical loads, including both heating and cooling loads, to calculate the total connected load. Select the one demand factor that applies from the table, then multiply the total connected load by this single demand factor.

The overload protection of the service conductors shall be in accordance with 230.90 and 240.4.

Feeder conductors shall not be required to be of greater ampacity than the service conductors.

Service or feeder conductors whose calculated load is determined by this optional calculation shall be permitted to have the neutral load determined by 120.61.

N Part V. Farm Load Calculations

N 120.100 General. Farm loads shall be calculated in accordance with Part V.

N 120.102 Farm Loads — Buildings and Other Loads.

N (A) Dwelling Unit. The feeder or service load of a farm dwelling unit shall be calculated in accordance with the provisions for dwellings in Article 120 Part III or IV. Where the dwelling has electric heat and the farm has electric grain-drying systems, Article 120 Part IV shall not be used to calculate the dwelling load where the dwelling and farm loads are supplied by a common service.

N (B) Other Than Dwelling Unit. Where a feeder or service supplies a farm building or other load having two or more separate branch circuits, the load for feeders, service conductors, and service equipment shall be calculated in accordance with demand factors not less than indicated in Table 120.102(B).

N 120.103 Farm Loads — Total. Where supplied by a common service, the total load of the farm for service conductors and service equipment shall be calculated in accordance with the farm dwelling unit load and demand factors specified in Table 120.103. Where there is equipment in two or more farm equipment buildings or for loads having the same function, such loads shall be calculated in accordance with Table 120.102(B) and shall be permitted to be combined as a single load in Table 120.103 for calculating the total load.

N Table 120.102(B) Method for Calculating Farm Loads for Other Than Dwelling Unit

Ampere Load at 240 Volts Maximum	Demand Factor (%)
The greater of the following:	
All loads that are expected to operate simultaneously, or	100
125 percent of the full load current of the largest motor, or	
First 60 amperes of the load	
Next 60 amperes of all other loads	50
Remainder of other loads	25

N Table 120.103 Method for Calculating Total Farm Load

Individual Loads Calculated in Accordance with Table 120.102(B)	Demand Factor (%)
Largest load	100
Second largest load	75
Third largest load	65
Remaining loads	50

Note: To this total load, add the load of the farm dwelling unit calculated in accordance with Article 120 Part III or IV. Where the dwelling has electric heat and the farm has electric grain-drying systems, Article 120 Part IV shall not be used to calculate the dwelling load.

N Part VI. Health Care Facilities

N 120.110 Receptacle Loads. Receptacle loads calculated in accordance with 120.14(H) and 120.14(I) and supplied by branch circuits not exceeding 150 volts to ground shall be permitted to be subjected to the demand factors provided in Table 120.110 for health care facilities.

Informational Note: See 120.14(I) for the calculation of receptacle outlet loads.

N 120.111 Patient Care–Related Electrical Equipment. Branch circuits not exceeding 120 volts to ground and rated 20 amperes that supply patient care–related electrical equipment and are calculated in accordance with 120.14(A) shall be permitted to be subjected to the demand factors provided in Table 120.111 for health care facilities.

N Part VII. Marinas, Boatyards, Floating Buildings, and Docking Facilities

N 120.120 Receptacle Loads. General lighting and other loads in marinas, boatyards, floating buildings, and docking facilities shall be calculated in accordance with Article 120 Part III, and the demand factors set forth in Table 120.120 shall be permitted for each service or feeder circuit supplying receptacles that provide shore power for boats. These calculations shall be permitted to be modified as indicated in Table 120.120, Notes

N Table 120.110 Demand Factors for Receptacles Supplied by General-Purpose Branch Circuits in Health Care Facilities

Portion of Receptacle Load to Which Demand Factor Applies (Volt-Amperes)	Demand Factor (%)
First 10,000 or less	100
Remainder over 10,000	20

N Table 120.111 Specific Patient Care–Related Electrical Use Demand Factor for Health Care Facilities

Number of Circuits	Demand Factor (%)
Largest 0–10	100
11 or more	30

1 and 2. Where demand factors of Table 120.120 are applied, the demand factor specified in 120.61(B) shall not be permitted.

Informational Note: These demand factors could be inadequate in areas of extreme hot or cold temperatures with loaded circuits for heating, air-conditioning, or refrigerating equipment.

N Part VIII. Recreational Vehicle Parks

N 120.130 Calculated Load.

N (A) Basis of Calculations. Electrical services and feeders shall be calculated on the basis of not less than all of the following:

(1) 12,000 volt-amperes per site equipped with 50-ampere, 208Y/120-volt or 120/240-volt supply facilities
(2) 3600 volt-amperes per site equipped with both 20-ampere and 30-ampere supply facilities
(3) 2400 volt-amperes per site equipped with only 20-ampere supply facilities
(4) 600 volt-amperes per site equipped with only 20-ampere supply facilities that are dedicated to tent sites

The demand factors set forth in Table 120.130(A) shall be the minimum allowable demand factors that shall be permitted in calculating load for service and feeders. Where the electrical supply for a recreational vehicle site has more than one receptacle.

Where the electrical supply is in a location that serves two recreational vehicles, the equipment for both sites shall comply with 551.77, and the calculated load shall only be calculated for the two receptacles with the highest rating.

N (B) Demand Factors. The demand factor for a given number of sites shall apply to all sites.

Informational Note No. 1: For example, 20 sites calculated at 45 percent of 3600 volt-amperes results in a permissible demand of 1620 volt-amperes per site or a total of 32,400 volt-amperes for 20 sites.

Informational Note No. 2: These demand factors may be inadequate in areas of extreme hot or cold temperature with loaded circuits for heating or air conditioning.

Loads for other amenities such as, but not limited to, service buildings, recreational buildings, and swimming pools shall be calculated separately and then be added to the value calculated for the recreational vehicle sites where they are all supplied by a common service.

N Part IX. Mobile and Manufactured Home Calculations

N 120.140 Calculations. The methods detailed in 120.140(A) through 120.140(C) shall be employed in calculating the supply-cord and distribution-panelboard load for each feeder assembly for each mobile home in lieu of the procedure shown in Article 120 Parts I through IV and be based on a 3-wire, 120/240-volt ac only supply with 120-volt loads balanced between the two ungrounded conductors of the 3-wire system.

N Table 120.120 Demand Factors for Shore Power Receptacle Loads

Number of Shore Power Receptacles	Sum of the Rating of the Receptacles (%)
1–4	100
5–8	90
9–14	80
15–30	70
31–40	60
41–50	50
51–70	40
≥71	30

Notes:
1. Where shore power accommodations provide two receptacles specifically for an individual boat slip and these receptacles have different voltages (e.g., one 30-ampere, 125-volt and one 50-ampere, 125/250-volt), only the receptacle with the larger kilowatt demand shall be required to be calculated.
2. For each shore-powered pedestal being installed that includes an individual kilowatt-hour submeter for each slip and is being calculated using the criteria listed in Table 120.120, the total demand amperes shall be permitted to be multiplied by 0.9 to achieve the final demand amperes of the facility.
3. If a circuit feeding a boat hoist and shore power for the same boat slip is shared, only the load with the larger kilowatt demand shall be required to be counted in the load calculation.

N Table 120.130(A) Demand Factors for Site Feeders and Service-Entrance Conductors for Park Sites

Number of Recreational Vehicle Sites	Demand Factor (%)
1	100
2	90
3	80
4	75
5	65
6	60
7–9	55
10–12	50
13–15	48
16–18	47
19–21	45
22–24	43
25–35	42
36 plus	41

N (A) Lighting, Small-Appliance, and Laundry Load. The following shall apply for lighting, small-appliance, and laundry loads:

(1) Lighting volt-amperes: length times width of mobile home floor (outside dimensions) times 33 volt-amperes/m^2 (3 VA/ft^2)— for example, length × width × 3 = lighting volt-amperes
(2) Small-appliance volt-amperes: number of circuits times 1500 volt-amperes for each 20-ampere appliance receptacle circuit — for example, number of circuits × 1500 = small-appliance volt-amperes
(3) Laundry area circuit volt-amperes: 1500 volt-amperes
(4) Total volt-amperes: lighting volt-amperes plus small-appliance volt-amperes plus laundry area volt-amperes equals total volt-amperes
(5) Net volt-amperes: first 3000 total volt-amperes at 100 percent plus remainder at 35 percent equals volt-amperes to be divided by 240 volts to obtain current (amperes) per leg

N (B) Total Load for Determining Power Supply. Total load for determining power supply shall be the sum of the following:

(1) Lighting and small-appliance load as calculated in 120.140(A)(5).
(2) Nameplate amperes for motors and heater loads (exhaust fans, air conditioners, electric, gas, or oil heating). Omit smaller of the heating and cooling loads, except include blower motor if used as air-conditioner evaporator motor. Where an air conditioner is not installed and a 40-ampere feeder assembly is provided, allow 15 amperes per phase for air conditioning.
(3) Twenty-five percent of current of largest motor in 120.140(B)(2).
(4) Total of nameplate amperes for waste disposer, dishwasher, water heater, clothes dryer, wall-mounted oven, and cooking units. Where the number of these appliances exceeds three, use 75 percent of total.
(5) Derive amperes for freestanding range (as distinguished from separate ovens and cooking units) by dividing the following values by 240 volts as shown in Table 120.140(B).
(6) If outlets or circuits are provided for other than factory-installed appliances, include the anticipated load.

Informational Note: See Informative Annex D Example D11 for an illustration of the application of this calculation.

N Table 120.140(B) Freestanding Range Load

Nameplate Rating (watts)	Use (volt-amperes)
0–10,000	80 percent of rating
Over 10,000–12,500	8,000
Over 12,500–13,500	8,400
Over 13,500–14,500	8,800
Over 14,500–15,500	9,200
Over 15,500–16,500	9,600
Over 16,500–17,500	10,000

N (C) Optional Method of Calculation for Lighting and Appliance Load. The optional method for calculating lighting and appliance load shown in 120.82 shall be permitted.

N 120.141 Allowable Demand Factors. Park electrical wiring systems shall be calculated (at 120/240 volts) on the larger of the following:

(1) 16,000 volt-amperes for each mobile home lot
(2) The load calculated in accordance with 120.140 for the largest typical mobile home that each lot will accept

It shall be permissible to calculate the feeder or service load in accordance with Table 120.141. No demand factor shall be allowed for any other load, except as provided in this code.

N Table 120.141 Demand Factors for Services and Feeders

Number of Mobile Homes	Demand Factor (%)
1	100
2	55
3	44
4	39
5	33
6	29
7–9	28
10–12	27
13–15	26
16–21	25
22–40	24
41–60	23
61 and over	22

N

ARTICLE 130
Energy Management Systems

N Part I. General

N 130.1 Scope. This article applies to the installation and operation of energy management systems.

Informational Note: Performance provisions in other codes may establish prescriptive requirements in addition to the requirements contained in this article.

N 130.2 Listing Requirements. Energy management equipment shall be listed. Energy management equipment providing overload control as covered in Article 130 Part II shall be listed and labeled as a power control system (PCS).

Informational Note No. 1: Evaluation of an energy management system with PCS functionality is different than an evaluation of a general energy management system.

Informational Note No. 2: See UL 916, *Energy Management Equipment*, for information on listed energy management equipment.

Informational Note No. 3: See UL 3141, *Power Control Systems*, for information on listed PCS equipment.

N 130.20 Alternate Power Sources. An energy management system shall not override any control necessary to ensure continuity of an alternate power source for the following:

(1) Fire pumps
(2) Health care facilities
(3) Emergency systems
(4) Legally required standby systems
(5) Critical operations power systems

***N* 130.30 Load Management.** Energy management systems shall be permitted to monitor and control electrical loads and sources in accordance with 130.30(A) through 130.30(C).

***N* (A) Load Shedding Controls.** An energy management system shall not override the load shedding controls put in place to ensure the minimum electrical capacity for the following:

(1) Fire pumps
(2) Emergency systems
(3) Legally required standby systems
(4) Critical operations power systems

***N* (B) Disconnection of Power.** An energy management system shall not cause disconnection of power to the following:

(1) Elevators, escalators, moving walks, or stairway lift chairs
(2) Positive mechanical ventilation for hazardous (classified) locations
(3) Ventilation used to exhaust hazardous gas or reclassify an area
(4) Circuits supplying emergency lighting
(5) Essential electrical systems in health care facilities

***N* (C) Capacity of Branch Circuit, Feeder, or Service.** An energy management system shall not cause a branch circuit, feeder, or service to be overloaded.

N Part II. Power Control Systems (PCS)

***N* 130.50 General.** Part II contains additional requirements for PCS, which are EMS that provide controls required to prevent the overloading of conductors and equipment.

***N* 130.60 Conductors and Equipment**

***N* (A) Monitoring and Controls.** The PCS shall include monitoring and automatic controls to prevent overload of conductors, power sources, and power distribution equipment associated with the PCS.

***N* (B) Malfunction.** The PCS shall transition to a controlled state that prevents overload in response to a failure or malfunction affecting the ability to monitor and control currents within the PCS. If a PCS is used to control overload conditions in circuits other than branch circuits, a malfunction in the PCS control system shall not result in the opening of the OCPD protecting the circuit.

Informational Note: Failure or malfunction due to single fault conditions are when the control system is not able to achieve or maintain the desired control setting. Responses to malfunctions are addressed by the product listing and associated documentation.

***N* 130.70 Settings.**

***N* (A) PCS Control Settings.** The PCS shall include control settings capable of being set in amperes for each controlled conductor, controlled source, or controlled load. The PCS control setting shall be considered as a continuous load.

Informational Note: Control settings can be used for calculating the connected load(s) and or source(s). See 120.7 for application with a PCS control setting used in load calculations and 705.13 if controlling power sources.

***N* (B) Adjustable Settings.** Adjustable settings for overload control functions shall be permitted to be accessed only by qualified persons through methods specified in accordance with its listing.

***N* 130.80 Marking and Documentation.**

***N* (A) Marking.** The equipment or circuits that supply the branch circuit, feeder, or service shall be marked with the following information in accordance with its listing:

(1) PCS control setting(s)
(2) In other than one- and two-family dwellings, the date of calculation and identification of the qualified person determining the settings
(3) Identification of loads and sources managed by the PCS
(4) The following or equivalent wording: "Circuits within this equipment are controlled by a power control system. The control settings shall only be changed by a qualified person."

The markings shall meet the requirements in 110.21(B) and shall be located such that they are clearly visible to qualified persons before examination, adjustment, or servicing of the equipment.

***N* (B) Documentation.** A list of the monitoring, control function(s), and control equipment and associated settings that perform the overload control functions shall be documented and readily available to qualified persons. The PCS shall be identified as either a multisource or single-source PCS, as applicable.

Informational Note No. 1: Listed PCS can include specific hardware and software components that are detailed in the documentation included with the listing.

Informational Note No. 2: A multisource PCS is rated for source control, or source and load control. A single-source PCS is rated for load control only.

***N* (C) Directory.** Where the PCS control equipment is not located within sight of the OCPDs for the controlled circuit(s), a directory identifying the controlled device(s) and associated circuit(s) shall be posted on the enclosure of the control device(s), disconnect, or OCPD.

Chapter 2 Wiring and Protection

ARTICLE 200
Use and Identification of Grounded Conductors

Δ **200.1 Scope.** This article provides requirements for the following:

(1) Identification of terminals
(2) Grounded conductors in premises wiring systems
(3) Identification of grounded conductors

Informational Note: See Article 100 for definitions of *Grounded Conductor, Equipment Grounding Conductor,* and *Grounding Electrode Conductor.*

Δ **200.4 General.** Grounded conductors shall comply with 200.4(A) and 200.4(B).

Δ **(A) Insulation.** Grounded conductors, if insulated, shall have insulation that complies with either one of the following:

(1) Is suitably rated, other than color, for any ungrounded conductors of the same circuit for systems of 1000 volts or less
(2) Is rated not less than 600 volts for solidly grounded neutral systems of over 1000 volts in accordance with 270.27(A)

(B) Continuity. The continuity of a grounded conductor shall not depend on a connection to a metal enclosure, raceway, or cable armor.

Informational Note: See 300.15(B) for the continuity of grounded conductors used in multiwire branch circuits.

200.5 Connection to Grounded System. Grounded conductors of premises wiring systems shall be electrically connected to the supply system grounded conductor to ensure a common, continuous grounded system. For the purpose of this section, *electrically connected* shall mean making a direct electrical connection capable of carrying current, as distinguished from induced currents.

Exception: Listed interactive inverters identified for use in distributed resource generation systems such as photovoltaic and fuel cell power systems shall be permitted to be connected to premises wiring without a grounded conductor if the connected premises wiring or utility system includes a grounded conductor.

Δ **200.6 Neutral Conductors.** Neutral conductors shall be installed in accordance with 200.6(A) and 200.6(B).

(A) Installation. Neutral conductors shall not be used for more than one branch circuit, for more than one multiwire branch circuit, or for more than one set of ungrounded feeder conductors unless specifically permitted elsewhere in this code.

Informational Note: See 215.14 for information on common neutrals.

(B) Multiple Circuits. Where more than one neutral conductor associated with different circuits is in an enclosure, grounded circuit conductors of each circuit shall be identified or grouped to correspond with the ungrounded circuit conductor(s) by wire markers, cable ties, or similar means in at least one location within the enclosure.

Exception No. 1: The requirement for grouping or identifying shall not apply if the branch-circuit or feeder conductors enter from a cable or a raceway unique to the circuit that makes the grouping obvious.

Exception No. 2: The requirement for grouping or identifying shall not apply where branch-circuit conductors pass through a box or conduit body without a loop as described in 314.16(B)(1) or without a splice or termination.

200.7 Means of Identifying Grounded Conductors.

Δ **(A) Sizes 6 AWG or Smaller.** The insulation of grounded conductors of 6 AWG or smaller shall be identified by one of the following means:

(1) A continuous white outer finish
(2) A continuous gray outer finish
(3) Three continuous white or gray stripes along the conductor's entire length on other than green insulation
(4) Conductors with white or gray insulation and colored tracer threads in the braid identifying the source of manufacture
(5) For a single-conductor, sunlight-resistant, outdoor-rated cable used as a solidly grounded conductor in photovoltaic power systems, as permitted by 690.31(C)(1), markings at terminations in accordance with 200.7(A)(1) through 200.7(A)(4) at the time of installation
(6) For a grounded conductor of a mineral-insulated, metal-sheathed cable (Type MI), a distinctive white or gray marking encircling the conductor insulation at its terminations at the time of installation
(7) For fixture wire, the grounded conductor identification requirements in accordance with 402.8
(8) For aerial cable, one of the methods in 200.7(A)(1) through 200.7(A)(5), or a ridge located on the exterior of the cable
(9) For conductors with a continuous white or gray outer finish, a single-colored stripe, other than green

Δ **(B) Sizes 4 AWG or Larger.** An insulated grounded conductor 4 AWG or larger shall be identified by one of the following means:

(1) A continuous white outer finish.
(2) A continuous gray outer finish.
(3) Three continuous white or gray stripes along the entire length on other than green insulation.
(4) At the time of installation, be identified by a distinctive white or gray marking at its terminations. This marking shall encircle the conductor insulation.

(C) Flexible Cords. An insulated conductor that is intended for use as a grounded conductor, where contained within a flexible cord, shall be identified by a white or gray outer finish or by methods permitted by 400.22.

Δ **(D) Grounded Conductors of Different Nominal Voltage Systems.** If grounded conductors of different nominal voltage systems are installed in the same raceway, cable, box, auxiliary gutter, or other type of enclosure, each grounded conductor shall be identified by nominal voltage system. Identification