Article 90 Introduction

90.1 Purpose
(A) Practical Safeguarding
(B) Adequacy
(C) Relation to Other International Standards

90.2 Scope
(A) Covered
(B) Not Covered
(C) Special Permission

90.3 Code Arrangement

90.4 Enforcement

90.5 Mandatory Rules, Permissive Rules, and Explanatory Material
(A) Mandatory Rules
(B) Permissive Rules
(C) Explanatory Material
(D) Informative Annexes

90.6 Formal Interpretations

90.7 Examination of Equipment for Safety

90.8 Wiring Planning
(A) Future Expansion and Convenience
(B) Number of Circuits in Enclosures

90.9 Units of Measurement
(A) Measurement System of Preference
(B) Dual System of Units
(C) Permitted Uses of Soft Conversion
(D) Compliance

Article 100 Definitions

Part I. General

Part II. Over 1000 Volts, Nominal

Article 110 Requirements for Electrical Installations

Part I. General

110.1 Scope

110.2 Approval

110.3 Examination, Identification, Installation, Use, and Listing (Product Certification) of Equipment
(A) Examination
(B) Installation and Use
(C) Listing

110.4 Voltages

110.5 Conductors

110.6 Conductor Sizes

110.7 Wiring Integrity

110.8 Wiring Methods

110.9 Interrupting Rating

110.10 Circuit Impedance, Short-Circuit Current Ratings, and Other Characteristics

110.11 Deteriorating Agents

110.12 Mechanical Execution of Work
(A) Unused Openings
(B) Integrity of Electrical Equipment and Connections

110.13 Mounting and Cooling of Equipment
(A) Mounting
(B) Cooling

110.14 Electrical Connections
(A) Terminals
(B) Splices
(C) Temperature Limitations
(D) Installation

110.15 High-Leg Marking

110.16 Arc-Flash Hazard Warning
(A) General
(B) Service Equipment

110.17 Arcing Parts

110.18 Light and Power from Railway Conductors

110.19 Marking
110.22 Identification of Disconnecting Means
(A) General
(B) Engineered Series Combination Systems
(C) Tested Series Combination Systems
110.23 Current Transformers
110.24 Available Fault Current
(A) Field Marking
(B) Modifications
110.25 Lockable Disconnecting Means

Part II. 1000 Volts, Nominal, or Less
110.26 Spaces About Electrical Equipment
(A) Working Space
(B) Clear Spaces
(C) Entrance to and Egress from Working Space
(D) Illumination
(E) Dedicated Equipment Space
(F) Locked Electrical Equipment Rooms or Enclosures
110.27 Guarding of Live Parts
(A) Live Parts Guarded Against Accidental Contact
(B) Prevent Physical Damage
(C) Warning Signs
110.28 Enclosure Types

Part III. Over 1000 Volts, Nominal
110.30 General
110.31 Enclosure for Electrical Installations
(A) Electrical Vaults
(B) Indoor Installations
(C) Outdoor Installations
(D) Enclosed Equipment Accessible to Unqualified Persons
110.32 Work Space About Equipment
110.33 Entrance to Enclosures and Access to Working Space
(A) Entrance
(B) Access
110.34 Work Space and Guarding
(A) Working Space
(B) Separation from Low-Voltage Equipment
(C) Locked Rooms or Enclosures
(D) Illumination
(E) Elevation of Unguarded Live Parts
(F) Protection of Service Equipment, Switchgear, and Industrial Control Assemblies
110.36 Circuit Conductors
110.40 Temperature Limitations at Terminations
110.41 Inspections and Tests
(A) Pre-energization and Operating Tests
(B) Test Report

Part IV. Tunnel Installations over 1000 Volts, Nominal
110.51 General
(A) Covered
(B) Other Articles
(C) Protection Against Physical Damage
110.52 Overcurrent Protection
110.53 Conductors
110.54 Bonding and Equipment Grounding Conductors
(A) Grounded and Bonded
(B) Equipment Grounding Conductors
110.55 Transformers, Switches, and Electrical Equipment
110.56 Energized Parts
110.57 Ventilation System Controls
110.58 Disconnecting Means
110.59 Enclosures
Part V. Manholes and Other Electrical Enclosures

Intended for Personnel Entry

110.70 General

110.71 Strength

110.72 Cabling Work Space

110.73 Equipment Work Space

110.74 Conductor Installation

(A) 1000 Volts, Nominal, or Less

(B) Over 1000 Volts, Nominal

110.75 Access to Manholes

(A) Dimensions

(B) Obstructions

(C) Location

(D) Covers

(E) Marking

110.76 Access to Vaults and Tunnels

(A) Location

(B) Locks

110.77 Ventilation

110.78 Guarding

110.79 Fixed Ladders

Article 200 Use and Identification of Grounded Conductors

200.1 Scope

200.2 General

200.3 Connection to Grounded System

200.4 Neutral Conductors

(A) Installation

(B) Multiple Circuits

200.6 Means of Identifying Grounded Conductors

(A) Sizes 6 AWG or Smaller

(B) Sizes 4 AWG or Larger

(C) Flexible Cords

200.7 Use of Insulation of a White or Gray Color or with Three Continuous White or Gray Stripes

(A) General

(B) Circuits of Less Than 50 Volts

(C) Circuits of 50 Volts or More

200.9 Means of Identification of Terminals

200.10 Identification of Terminals

(A) Device Terminals

(B) Receptacles, Plugs, and Connectors

(C) Screw Shells

(D) Screw Shell Devices with Leads

(E) Appliances

200.11 Polarity of Connections

Article 210 Branch Circuits

Part I. General Provisions

210.1 Scope

210.3 Other Articles for Specific-Purpose Branch Circuits

210.4 Multiwire Branch Circuits

(A) General

(B) Disconnecting Means

(C) Line-to-Neutral Loads

(D) Grouping

210.5 Identification for Branch Circuits

(A) Grounded Conductor

(B) Equipment Grounding Conductor

(C) Identification of Ungrounded Conductors

210.6 Branch-Circuit Voltage Limitations

(A) Occupancy Limitation

(B) 120 Volts Between Conductors

(C) 277 Volts to Ground

(D) 600 Volts Between Conductors
(E) Over 600 Volts Between Conductors

210.7 Multiple Branch Circuits

210.8 Ground-Fault Circuit-Interrupter Protection for Personnel

(A) Dwelling Units

(B) Other Than Dwelling Units

(C) Boat Hoists

(D) Kitchen Dishwasher Branch Circuit

(E) Crawl Space Lighting Outlets

210.9 Circuits Derived from Autotransformers

210.10 Ungrounded Conductors Tapped from Grounded Systems

210.11 Branch Circuits Required

(A) Number of Branch Circuits

(B) Load Evenly Proportioned Among Branch Circuits

(C) Dwelling Units

210.12 Arc-Fault Circuit-Interrupter Protection

(A) Dwelling Units

(B) Dormitory Units

(C) Guest Rooms and Guest Suites

(D) Branch Circuit Extensions or Modifications — Dwelling Units and Dormitory Units

210.13 Ground-Fault Protection of Equipment

210.14 Power Circuit Protection

210.15 Branch-Circuit Overcurrent Protection

210.16 Generating Equipment Overcurrent Protection

210.17 Guest Rooms and Guest Suites

Part II. Branch-Circuit Ratings

210.18 Rating

210.19 Conductors — Minimum Ampacity and Size

(A) Branch Circuits Not More Than 600 Volts

(B) Branch Circuits Over 600 Volts

210.20 Overcurrent Protection

(A) Continuous and Noncontinuous Loads

(B) Conductor Protection

(C) Equipment

(D) Outlet Devices

210.21 Outlet Devices

(A) Lampholders

(B) Receptacles

210.22 Permissible Loads, Individual Branch Circuits

210.23 Permissible Loads, Multiple-Outlet Branch Circuits

(A) 15- and 20-Ampere Branch Circuits

(B) 30-Ampere Branch Circuits

(C) 40- and 50-Ampere Branch Circuits

(D) Branch Circuits Larger Than 50 Amperes

210.24 Branch-Circuit Requirements — Summary

210.25 Branch Circuits in Buildings with More Than One Occupancy

(A) Dwelling Unit Branch Circuits

(B) Common Area Branch Circuits

Part III. Required Outlets

210.50 General

(A) Cord Pendants

(B) Cord Connections

(C) Appliance Receptacle Outlets

210.52 Dwelling Unit Receptacle Outlets

(A) General Provisions

(B) Small Appliances

(C) Countertops and Work Surfaces

(D) Bathrooms

(E) Outdoor Outlets

(F) Laundry Areas

(G) Basements, Garages, and Accessory Buildings

(H) Hallways

(I) Foyers

210.60 Guest Rooms, Guest Suites, Dormitories, and Similar Occupancies

(A) General
Article 210.62 Show Windows

Article 210.63 Heating, Air-Conditioning, and Refrigeration Equipment Outlet

Article 210.64 Electrical Service Areas

Article 210.70 Lighting Outlets Required

(A) Dwelling Units

(B) Guest Rooms or Guest Suites

(C) All Occupancies

Article 215.1 Scope

Article 215.2 Minimum Rating and Size

(A) Feeders Not More Than 600 Volts

(B) Feeders over 600 Volts

Article 215.3 Overcurrent Protection

Article 215.4 Feeders with Common Neutral Conductor

(A) Feeders with Common Neutral

(B) In Metal Raceway or Enclosure

Article 215.5 Diagrams of Feeders

Article 215.6 Feeder Equipment Grounding Conductor

Article 215.7 Ungrounded Conductors Tapped from Grounded Systems

Article 215.9 Ground-Fault Circuit-Interrupter Protection for Personnel

Article 215.10 Ground-Fault Protection of Equipment

Article 215.11 Circuits Derived from Autotransformers

Article 215.12 Identification for Feeders

(A) Grounded Conductor

(B) Equipment Grounding Conductor

(C) Identification of Ungrounded Conductors

Article 220 Branch-Circuit, Feeder, and Service Load Calculations

Part I. General

220.1 Scope

220.3 Other Articles for Specific-Purpose Calculations

220.5 Calculations

(A) Voltages

(B) Fractions of an Ampere

Part II. Branch-Circuit Load Calculations

220.10 General

220.12 Lighting Load for Specified Occupancies

220.14 Other Loads — All Occupancies

(A) Specific Appliances or Loads

(B) Electric Dryers and Electric Cooking Appliances in Dwellings and Household Cooking Appliances Used in Instructional Programs

(D) Luminaires

(E) Heavy-Duty Lampholders

(F) Sign and Outline Lighting

(G) Show Windows

(H) Fixed Multioutlet Assemblies

(I) Receptacle Outlets

(J) Dwelling Occupancies

(K) Banks and Office Buildings

(L) Other Outlets

220.16 Loads for Additions to Existing Installations

(A) Dwelling Units

(B) Other Than Dwelling Units

220.18 Maximum Loads

(A) Motor-Operated and Combination Loads

(B) Inductive and LED Lighting Loads
(C) Range Loads

Part III. Feeder and Service Load Calculations

220.40 General

220.42 General Lighting

220.43 Show-Window and Track Lighting

(A) Show Windows

(B) Track Lighting

220.44 Receptacle Loads — Other Than Dwelling Units

220.50 Motors

220.51 Fixed Electric Space Heating

220.52 Small-Appliance and Laundry Loads — Dwelling Unit

(A) Small-Appliance Circuit Load

(B) Laundry Circuit Load

220.53 Appliance Load — Dwelling Unit(s)

220.54 Electric Clothes Dryers — Dwelling Unit(s)

220.55 Electric Cooking Appliances in Dwelling Units and Household Cooking Appliances Used in Instructional Programs

220.56 Kitchen Equipment — Other Than Dwelling Unit(s)

220.60 Noncoincident Loads

220.61 Feeder or Service Neutral Load

(A) Basic Calculation

(B) Permitted Reductions

(C) Prohibited Reductions

Part IV. Optional Feeder and Service Load Calculations

220.80 General

220.82 Dwelling Unit

(A) Feeder and Service Load

(B) General Loads

(C) Heating and Air-Conditioning Load

220.83 Existing Dwelling Unit

(A) Where Additional Air-Conditioning Equipment or Electric Space-Heating Equipment Is Not to Be Installed

(B) Where Additional Air-Conditioning Equipment or Electric Space-Heating Equipment Is to Be Installed

220.84 Multifamily Dwelling

(A) Feeder or Service Load

(B) House Loads

(C) Calculated Loads

220.85 Two Dwelling Units

220.86 Schools

220.87 Determining Existing Loads

220.88 New Restaurants

Part V. Farm Load Calculations

220.100 General

220.102 Farm Loads — Buildings and Other Loads

(A) Dwelling Unit

(B) Other Than Dwelling Unit

220.103 Farm Loads — Total

Article 225 Outside Branch Circuits and Feeders

225.1 Scope

225.3 Other Articles

Part I. General

225.4 Conductor Covering

225.5 Size of Conductors 600 Volts, Nominal, or Less

225.6 Conductor Size and Support

(A) Overhead Spans

(B) Festoon Lighting

225.7 Lighting Equipment Installed Outdoors

(A) General

(B) Common Neutral

(C) 277 Volts to Ground
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>(D)</td>
<td>1000 Volts Between Conductors</td>
</tr>
<tr>
<td>225.8</td>
<td>Calculation of Loads 1000 Volts, Nominal, or Less</td>
</tr>
<tr>
<td>(A)</td>
<td>Branch Circuits</td>
</tr>
<tr>
<td>(B)</td>
<td>Feeders</td>
</tr>
<tr>
<td>225.10</td>
<td>Wiring on Buildings (or Other Structures)</td>
</tr>
<tr>
<td>225.11</td>
<td>Feeder and Branch-Circuit Conductors Entering, Exiting, or Attached to Buildings or Structures</td>
</tr>
<tr>
<td>225.12</td>
<td>Open-Conductor Supports</td>
</tr>
<tr>
<td>225.14</td>
<td>Open-Conductor Spacings</td>
</tr>
<tr>
<td>(A)</td>
<td>1000 Volts, Nominal, or Less</td>
</tr>
<tr>
<td>(B)</td>
<td>Over 1000 Volts, Nominal</td>
</tr>
<tr>
<td>(C)</td>
<td>Separation from Other Circuits</td>
</tr>
<tr>
<td>(D)</td>
<td>Conductors on Poles</td>
</tr>
<tr>
<td>225.15</td>
<td>Supports over Buildings</td>
</tr>
<tr>
<td>225.16</td>
<td>Attachment to Buildings</td>
</tr>
<tr>
<td>(A)</td>
<td>Point of Attachment</td>
</tr>
<tr>
<td>(B)</td>
<td>Means of Attachment</td>
</tr>
<tr>
<td>225.17</td>
<td>Masts as Supports</td>
</tr>
<tr>
<td>(A)</td>
<td>Strength</td>
</tr>
<tr>
<td>(B)</td>
<td>Attachment</td>
</tr>
<tr>
<td>225.18</td>
<td>Clearance for Overhead Conductors and Cables</td>
</tr>
<tr>
<td>225.19</td>
<td>Clearances from Buildings for Conductors of Not over 1000 Volts, Nominal</td>
</tr>
<tr>
<td>(A)</td>
<td>Above Roofs</td>
</tr>
<tr>
<td>(B)</td>
<td>From Nonbuilding or Nonbridge Structures</td>
</tr>
<tr>
<td>(C)</td>
<td>Horizontal Clearances</td>
</tr>
<tr>
<td>(D)</td>
<td>Final Spans</td>
</tr>
<tr>
<td>(E)</td>
<td>Zone for Fire Ladders</td>
</tr>
<tr>
<td>225.20</td>
<td>Protection Against Physical Damage</td>
</tr>
<tr>
<td>225.21</td>
<td>Multiconductor Cables on Exterior Surfaces of Buildings (or Other Structures)</td>
</tr>
<tr>
<td>225.22</td>
<td>Raceways on Exterior Surfaces of Buildings or Other Structures</td>
</tr>
<tr>
<td>225.23</td>
<td>Multiconductor Cables on Exterior Surfaces of Buildings</td>
</tr>
<tr>
<td>225.24</td>
<td>Outdoor Lampholders</td>
</tr>
<tr>
<td>225.25</td>
<td>Location of Outdoor Lamps</td>
</tr>
<tr>
<td>225.26</td>
<td>Vegetation as Support</td>
</tr>
<tr>
<td>225.27</td>
<td>Raceway Seal</td>
</tr>
<tr>
<td>225.30</td>
<td>Number of Supplies</td>
</tr>
<tr>
<td>(A)</td>
<td>Special Conditions</td>
</tr>
<tr>
<td>(B)</td>
<td>Special Occupancies</td>
</tr>
<tr>
<td>(C)</td>
<td>Capacity Requirements</td>
</tr>
<tr>
<td>(D)</td>
<td>Different Characteristics</td>
</tr>
<tr>
<td>(E)</td>
<td>Documented Switching Procedures</td>
</tr>
<tr>
<td>(F)</td>
<td>One- or Two-Family Dwelling Unit(s)</td>
</tr>
<tr>
<td>225.31</td>
<td>Disconnecting Means</td>
</tr>
<tr>
<td>225.32</td>
<td>Location</td>
</tr>
<tr>
<td>225.33</td>
<td>Maximum Number of Disconnects</td>
</tr>
<tr>
<td>(A)</td>
<td>General</td>
</tr>
<tr>
<td>(B)</td>
<td>Single-Pole Units</td>
</tr>
<tr>
<td>225.34</td>
<td>Grouping of Disconnects</td>
</tr>
<tr>
<td>225.35</td>
<td>Access to Occupants</td>
</tr>
<tr>
<td>225.36</td>
<td>Type of Disconnecting Means</td>
</tr>
<tr>
<td>225.37</td>
<td>Identification</td>
</tr>
<tr>
<td>(A)</td>
<td>Manually or Power Operable</td>
</tr>
<tr>
<td>(B)</td>
<td>Simultaneous Opening of Poles</td>
</tr>
<tr>
<td>(C)</td>
<td>Disconnection of Grounded Conductor</td>
</tr>
<tr>
<td>(D)</td>
<td>Indicating</td>
</tr>
<tr>
<td>225.39</td>
<td>Rating of Disconnect</td>
</tr>
<tr>
<td>(A)</td>
<td>One-Circuit Installation</td>
</tr>
<tr>
<td>(B)</td>
<td>Two-Circuit Installations</td>
</tr>
<tr>
<td>(C)</td>
<td>One-Family Dwelling</td>
</tr>
<tr>
<td>Section</td>
<td>Title</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>(D) All Others</td>
<td>Supplied Through Another</td>
</tr>
<tr>
<td>225.40 Access to Overcurrent Protective Devices</td>
<td>230.6 Conductors Considered Outside the Building</td>
</tr>
<tr>
<td>Part III. Over 1000 Volts</td>
<td>230.7 Other Conductors in Raceway or Cable</td>
</tr>
<tr>
<td>225.50 Sizing of Conductors</td>
<td>230.8 Raceway Seal</td>
</tr>
<tr>
<td>225.51 Isolating Switches</td>
<td>230.9 Clearances</td>
</tr>
<tr>
<td>225.52 Disconnecting Means</td>
<td>(A) Clearances</td>
</tr>
<tr>
<td>(A) Location</td>
<td>(B) Vertical Clearance</td>
</tr>
<tr>
<td>(B) Type</td>
<td>(C) Building Openings</td>
</tr>
<tr>
<td>(C) Locking</td>
<td>230.10 Vegetation as Support</td>
</tr>
<tr>
<td>(D) Indicating</td>
<td>Part II. Overhead Service Conductors</td>
</tr>
<tr>
<td>(E) Uniform Position</td>
<td>230.22 Insulation or Covering</td>
</tr>
<tr>
<td>(F) Identification</td>
<td>230.23 Size and Rating</td>
</tr>
<tr>
<td>225.56 Inspections and Tests</td>
<td>(A) General</td>
</tr>
<tr>
<td>(A) Pre-Energization and Operating Tests</td>
<td>(B) Minimum Size</td>
</tr>
<tr>
<td>(B) Test Report</td>
<td>(C) Grounded Conductors</td>
</tr>
<tr>
<td>225.60 Clearances over Roadways, Walkways, Rail, Water, and Open Land</td>
<td>230.24 Clearances</td>
</tr>
<tr>
<td>(A) 22 kV, Nominal, to Ground or Less</td>
<td>(A) Above Roofs</td>
</tr>
<tr>
<td>(B) Over 22 kV Nominal to Ground</td>
<td>(B) Vertical Clearance for Overhead Service Conductors</td>
</tr>
<tr>
<td>(C) Special Cases</td>
<td>(C) Clearance from Building Openings</td>
</tr>
<tr>
<td>225.61 Clearances over Buildings and Other Structures</td>
<td>(D) Clearance from Swimming Pools</td>
</tr>
<tr>
<td>(A) 22 kV Nominal to Ground or Less</td>
<td>(E) Clearance from Communication Wires and Cables</td>
</tr>
<tr>
<td>(B) Over 22 kV Nominal to Ground</td>
<td>230.26 Point of Attachment</td>
</tr>
<tr>
<td>Article 230 Services</td>
<td>230.27 Means of Attachment</td>
</tr>
<tr>
<td>230.1 Scope</td>
<td>230.28 Service Masts as Supports</td>
</tr>
<tr>
<td>Part I. General</td>
<td>(A) Strength</td>
</tr>
<tr>
<td>230.2 Number of Services</td>
<td>(B) Attachment</td>
</tr>
<tr>
<td>(A) Special Conditions</td>
<td>230.29 Supports over Buildings</td>
</tr>
<tr>
<td>(B) Special Occupancies</td>
<td>Part III. Underground Service Conductors</td>
</tr>
<tr>
<td>(C) Capacity Requirements</td>
<td>230.30 Installation</td>
</tr>
<tr>
<td>(D) Different Characteristics</td>
<td>(A) Insulation</td>
</tr>
<tr>
<td>(E) Identification</td>
<td>(B) Wiring Methods</td>
</tr>
<tr>
<td>230.3 One Building or Other Structure Not to Be</td>
<td>230.31 Size and Rating</td>
</tr>
<tr>
<td>230.6 Conductors Considered Outside the Building</td>
<td>(A) General</td>
</tr>
</tbody>
</table>
(B) Minimum Size

(C) Grounded Conductors

230.32 Protection Against Damage

230.33 Spliced Conductors

Part IV. Service-Entrance Conductors

230.40 Number of Service-Entrance Conductor Sets

230.41 Insulation of Service-Entrance Conductors

230.42 Minimum Size and Rating

(A) General

(B) Specific Installations

(C) Grounded Conductors

230.43 Wiring Methods for 1000 Volts, Nominal, or Less

230.44 Cable Trays

230.46 Spliced Conductors

230.50 Protection Against Physical Damage

(A) Underground Service-Entrance Conductors

(B) All Other Service-Entrance Conductors

230.51 Mounting Supports

(A) Service-Entrance Cables

(B) Other Cables

(C) Individual Open Conductors

230.52 Individual Conductors Entering Buildings or Other Structures

230.53 Raceways to Drain

230.54 Overhead Service Locations

(A) Service Head

(B) Service-Entrance Cables Equipped with Service Head or Gooseneck

(C) Service Heads and Goosenecks Above Service-Drop or Overhead Service Attachment

(D) Secured

(E) Separately Bushed Openings

(F) Drip Loops

(G) Arranged That Water Will Not Enter Service Raceway or Equipment

230.56 Service Conductor with the Higher Voltage to Ground

Part V. Service Equipment — General

230.62 Service Equipment — Enclosed or Guarded

(A) Enclosed

(B) Guarded

230.66 Marking

Part VI. Service Equipment — Disconnecting Means

230.70 General

(A) Location

(B) Marking

(C) Suitable for Use

230.71 Maximum Number of Disconnects

(A) General

(B) Single-Pole Units

230.72 Grouping of Disconnects

230.74 Simultaneous Opening of Poles

230.75 Disconnection of Grounded Conductor

230.76 Manually or Power Operable

230.77 Indicating

230.79 Rating of Service Disconnecting Means

(A) One-Circuit Installations

(B) Two-Circuit Installations

(C) One-Family Dwellings

(D) All Others

230.80 Combined Rating of Disconnects

230.81 Connection to Terminals

230.82 Equipment Connected to the Supply Side
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>230.90</td>
<td>Where Required</td>
</tr>
<tr>
<td>(A)</td>
<td>Ungrounded Conductor</td>
</tr>
<tr>
<td>(B)</td>
<td>Not in Grounded Conductor</td>
</tr>
<tr>
<td>230.91</td>
<td>Location</td>
</tr>
<tr>
<td>230.92</td>
<td>Locked Service Overcurrent Devices</td>
</tr>
<tr>
<td>230.93</td>
<td>Protection of Specific Circuits</td>
</tr>
<tr>
<td>230.94</td>
<td>Relative Location of Overcurrent Device and Other Service Equipment</td>
</tr>
<tr>
<td>230.95</td>
<td>Ground-Fault Protection of Equipment</td>
</tr>
<tr>
<td>(A)</td>
<td>Setting</td>
</tr>
<tr>
<td>(B)</td>
<td>Fuses</td>
</tr>
<tr>
<td>(C)</td>
<td>Performance Testing</td>
</tr>
<tr>
<td>230.200</td>
<td>General</td>
</tr>
<tr>
<td>230.202</td>
<td>Service-Entrance Conductors</td>
</tr>
<tr>
<td>(A)</td>
<td>Conductor Size</td>
</tr>
<tr>
<td>(B)</td>
<td>Wiring Methods</td>
</tr>
<tr>
<td>230.204</td>
<td>Isolating Switches</td>
</tr>
<tr>
<td>(A)</td>
<td>Where Required</td>
</tr>
<tr>
<td>(B)</td>
<td>Fuses as Isolating Switch</td>
</tr>
<tr>
<td>(C)</td>
<td>Accessible to Qualified Persons Only</td>
</tr>
<tr>
<td>(D)</td>
<td>Connection to Ground</td>
</tr>
<tr>
<td>230.205</td>
<td>Disconnecting Means</td>
</tr>
<tr>
<td>(A)</td>
<td>Location</td>
</tr>
<tr>
<td>(B)</td>
<td>Type</td>
</tr>
<tr>
<td>(C)</td>
<td>Remote Control</td>
</tr>
<tr>
<td>230.206</td>
<td>Overcurrent Devices as Disconnecting Means</td>
</tr>
<tr>
<td>230.208</td>
<td>Protection Requirements</td>
</tr>
<tr>
<td>(A)</td>
<td>Equipment Type</td>
</tr>
<tr>
<td>(B)</td>
<td>Enclosed Overcurrent Devices</td>
</tr>
<tr>
<td>230.209</td>
<td>Surge Arresters</td>
</tr>
<tr>
<td>230.211</td>
<td>Switchgear</td>
</tr>
<tr>
<td>230.212</td>
<td>Over 35,000 Volts</td>
</tr>
<tr>
<td>Article 240</td>
<td>Overcurrent Protection</td>
</tr>
<tr>
<td>Part I. General</td>
<td></td>
</tr>
<tr>
<td>240.1</td>
<td>Scope</td>
</tr>
<tr>
<td>240.2</td>
<td>Definitions</td>
</tr>
<tr>
<td>240.3</td>
<td>Other Articles</td>
</tr>
<tr>
<td>240.4</td>
<td>Protection of Conductors</td>
</tr>
<tr>
<td>(A)</td>
<td>Power Loss Hazard</td>
</tr>
<tr>
<td>(B)</td>
<td>Overcurrent Devices Rated 800 Amperes or Less</td>
</tr>
<tr>
<td>(C)</td>
<td>Overcurrent Devices Rated over 800 Amperes</td>
</tr>
<tr>
<td>(D)</td>
<td>Small Conductors</td>
</tr>
<tr>
<td>(E)</td>
<td>Tap Conductors</td>
</tr>
<tr>
<td>(F)</td>
<td>Transformer Secondary Conductors</td>
</tr>
<tr>
<td>(G)</td>
<td>Overcurrent Protection for Specific Conductor Applications</td>
</tr>
<tr>
<td>240.5</td>
<td>Protection of Flexible Cords, Flexible Cables, and Fixture Wires</td>
</tr>
<tr>
<td>(A)</td>
<td>Ampacities</td>
</tr>
<tr>
<td>(B)</td>
<td>Branch-Circuit Overcurrent Device</td>
</tr>
<tr>
<td>240.6</td>
<td>Standard Ampere Ratings</td>
</tr>
<tr>
<td>(A)</td>
<td>Fuses and Fixed-Trip Circuit Breakers</td>
</tr>
<tr>
<td>(B)</td>
<td>Adjustable-Trip Circuit Breakers</td>
</tr>
<tr>
<td>(C)</td>
<td>Restricted Access Adjustable-Trip Circuit Breakers</td>
</tr>
<tr>
<td>240.8</td>
<td>Fuses or Circuit Breakers in Parallel</td>
</tr>
<tr>
<td>240.9</td>
<td>Thermal Devices</td>
</tr>
<tr>
<td>240.10</td>
<td>Supplementary Overcurrent Protection</td>
</tr>
<tr>
<td>240.12</td>
<td>Electrical System Coordination</td>
</tr>
<tr>
<td>240.13</td>
<td>Ground-Fault Protection of Equipment</td>
</tr>
<tr>
<td>240.15</td>
<td>Ungrounded Conductors</td>
</tr>
<tr>
<td>(A)</td>
<td>Overcurrent Device Required</td>
</tr>
<tr>
<td>(B)</td>
<td>Circuit Breaker as Overcurrent Device</td>
</tr>
</tbody>
</table>
2017 NEC TABLE OF CONTENTS

Part II. Location

240.21 Location in Circuit
  (A) Branch-Circuit Conductors
  (B) Feeder Taps
  (C) Transformer Secondary Conductors
  (D) Service Conductors
  (E) Busway Taps
  (F) Motor Circuit Taps
  (G) Conductors from Generator Terminals
  (H) Battery Conductors

240.22 Grounded Conductor

240.23 Change in Size of Grounded Conductor

240.24 Location in or on Premises
  (A) Accessibility
  (B) Occupancy
  (C) Not Exposed to Physical Damage
  (D) Not in Vicinity of Easily Ignitible Material
  (E) Not Located in Bathrooms
  (F) Not Located over Steps

Part III. Enclosures

240.30 General
  (A) Protection from Physical Damage
  (B) Operating Handle
  (C) Marking

240.32 Damp or Wet Locations

240.33 Vertical Position

Part IV. Disconnecting and Guarding

240.40 Disconnecting Means for Fuses
  (A) Location
  (B) Suddenly Moving Parts

240.41 Arcing or Suddenly Moving Parts
  (A) Location
  (B) Suddenly Moving Parts

Part V. Plug Fuses, Fuseholders, and Adapters

240.50 General
  (A) Maximum Voltage
  (B) Marking
  (C) Hexagonal Configuration
  (D) No Energized Parts
  (E) Screw Shell

240.51 Edison-Base Fuses
  (A) Classification
  (B) Replacement Only

240.52 Edison-Base Fuseholders
  (A) To Fit Edison-Base Fuseholders
  (B) To Fit Type S Fuses Only
  (C) Nonremovable
  (D) Nontamperable
  (E) Interchangeability

240.53 Type S Fuses

240.54 Type S Fuses, Adapters, and Fuseholders

Part VI. Cartridge Fuses and Fuseholders

240.60 General
  (A) Maximum Voltage — 300-Volt Type
  (B) Noninterchangeable — 0–6000-Ampere

240.61 Classification

240.67 Arc Energy Reduction
  (A) Documentation
  (B) Method to Reduce Clearing Time

Part VII. Circuit Breakers

240.80 Method of Operation
  (A) Maximum Voltage

240.81 Indicating

240.82 Nontamperable

240.83 Marking
(A) Durable and Visible

(B) Location

(C) Interrupting Rating

(D) Used as Switches

(E) Voltage Marking

240.85 Applications

240.86 Series Ratings

(A) Selected Under Engineering Supervision

in Existing Installations

(B) Tested Combinations

(C) Motor Contribution

240.87 Arc Energy Reduction

(A) Documentation

(B) Method to Reduce Clearing Time

Part VIII. Supervised Industrial Installations

240.90 General

240.91 Protection of Conductors

(A) General

(B) Devices Rated Over 800 Amperes

240.92 Location in Circuit

(A) Feeder and Branch-Circuit Conductors

(B) Feeder Taps

(C) Transformer Secondary Conductors

of Separately Derived Systems

(D) Outside Feeder Taps

(E) Protection by Primary Overcurrent Device

Part IX. Overcurrent Protection over 1000 Volts, Nominal

240.100 Feeders and Branch Circuits

(A) Location and Type of Protection

(B) Protective Devices

(C) Conductor Protection

240.101 Additional Requirements for Feeders

(A) Rating or Setting of Overcurrent Protective Devices

(B) Feeder Taps

Article 250 Grounding and Bonding

Part I. General

250.1 Scope

250.2 Definition

250.3 Application of Other Articles

250.4 General Requirements for Grounding and Bonding

(A) Grounded Systems

(B) Ungrounded Systems

250.6 Objectionable Current

(A) Arrangement to Prevent Objectionable Current

(B) Alterations to Stop Objectionable Current

(C) Temporary Currents Not Classified as Objectionable Currents

(D) Limitations to Permissible Alterations

(E) Isolation of Objectionable Direct-Current Ground Currents

250.8 Connection of Grounding and Bonding Equipment

(A) Permitted Methods

(B) Methods Not Permitted

250.10 Protection of Ground Clamps and Fittings

250.12 Clean Surfaces

Part II. System Grounding

250.20 Alternating-Current Systems to Be Grounded

(A) Alternating-Current Systems of Less Than 50 Volts

(B) Alternating-Current Systems of 50 Volts to 1000 Volts

(C) Alternating-Current Systems of over 1000 Volts

(D) Impedance Grounded Neutral Systems

250.21 Alternating-Current Systems of 50 Volts to 1000 Volts Not Required to Be Grounded

(A) General

(B) Ground Detectors
2017 NEC TABLE OF CONTENTS

(C) Marking
250.22 Circuits Not to Be Grounded
250.24 Grounding Service-Supplied Alternating-Current Systems
(A) System Grounding Connections
(B) Main Bonding Jumper
(C) Grounded Conductor Brought to Service Equipment
(D) Grounding Electrode Conductor
(E) Ungrounded System Grounding Connections
250.26 Conductor to Be Grounded — Alternating-Current Systems
250.28 Main Bonding Jumper and System Bonding Jumper
(A) Material
(B) Construction
(C) Attachment
(D) Size
250.30 Grounding Separately Derived Alternating Current Systems
(A) Grounded Systems
(B) Ungrounded Systems
(C) Outdoor Source
250.32 Buildings or Structures Supplied by a Feeder(s) or Branch Circuit(s)
(A) Grounding Electrode
(B) Grounded Systems
(C) Ungrounded Systems
(D) Disconnecting Means Located in Separate Building or Structure on the Same Premises
(E) Grounding Electrode Conductor
250.34 Portable and Vehicle-Mounted Generators
(A) Portable Generators
(B) Vehicle-Mounted Generators
(C) Grounded Conductor Bonding
250.35 Permanently Installed Generators
(A) Separately Derived System
(B) Nonseparately Derived System
250.36 High-Impedance Grounded Neutral Systems
(A) Location
(B) Conductor Insulation and Ampacity
(C) System Grounding Connection
(D) Conductor Routing
(E) Equipment Bonding Jumper
(F) Grounding Electrode Conductor Connection Location
(G) Equipment Bonding Jumper Size
Part III. Grounding Electrode System and Grounding Electrode Conductor
250.50 Grounding Electrode System
250.52 Grounding Electrodes
(A) Electrodes Permitted for Grounding
(B) Not Permitted for Use as Grounding Electrodes
250.53 Grounding Electrode System Installation
(A) Rod, Pipe, and Plate Electrodes
(B) Electrode Spacing
(C) Bonding Jumper
(D) Metal Underground Water Pipe
(E) Supplemental Electrode Bonding Connection Size
(F) Ground Ring
(G) Rod and Pipe Electrodes
(H) Plate Electrode
250.54 Auxiliary Grounding Electrodes
250.58 Common Grounding Electrode
250.60 Use of Strike Termination Devices
250.62 Grounding Electrode Conductor Material
250.64 Grounding Electrode Conductor Installation
(A) Aluminum or Copper-Clad Aluminum Conductors
(B) Securing and Protection Against Physical Damage
2017 NEC TABLE OF CONTENTS

(C) Continuous
(D) Building or Structure with Multiple Disconnecting Means in Separate Enclosures
(E) Raceways and Enclosures for Grounding Electrode Conductors
(F) Installation to Electrode(s)

250.66 Size of Alternating-Current Grounding Electrode Conductor

(A) Connections to a Rod, Pipe, or Plate Electrode(s)
(B) Connections to Concrete-Encased Electrodes
(C) Connections to Ground Rings

250.68 Grounding Electrode Conductor and Bonding Jumper Connection to Grounding Electrodes

(A) Accessibility
(B) Effective Grounding Path
(C) Grounding Electrode Conductor Connections

250.70 Methods of Grounding and Bonding Conductor Connection to Electrodes

Part IV. Enclosure, Raceway, and Service Cable Connections

250.80 Service Raceways and Enclosures

(A) Underground Service Cable or Raceway

(B) Underground Service Raceway Containing Cable

250.86 Other Conductor Raceway and Service Cable

Part V. Bonding

250.90 General

250.92 Services

(A) Bonding of Equipment for Services

(B) Method of Bonding at the Service

250.94 Bonding for Communication Systems

(A) The Intersystem Bonding Termination Device

(B) Other Means

250.96 Bonding Other Enclosures

250.97 Bonding for Over 250 Volts

250.98 Bonding Loosely Jointed Metal Raceways

250.100 Bonding in Hazardous (Classified) Locations

250.102 Grounded Conductor, Bonding Conductors, and Jumpers

Part VI. Equipment Grounding and Equipment Grounding Conductors

250.110 Equipment Fastened in Place (Fixed) or Connected by Permanent Wiring Methods

250.112 Specific Equipment Fastened in Place (Fixed) or Connected by Permanent Wiring Methods

(A) Switchgear and Switchboard Frames and Structures

(B) Pipe Organs

(C) Motor Frames

(D) Enclosures for Motor Controllers

(E) Elevators and Cranes

(F) Garages, Theaters, and Motion Picture Studios

(G) Electric Signs

(H) Motion Picture Projection Equipment
(I) Remote-Control, Signaling, and Fire Alarm Circuits

(J) Luminaires

(K) Skid-Mounted Equipment

(L) Motor-Operated Water Pumps

(M) Metal Well Casings

250.114 Equipment Connected by Cord and Plug

250.116 Nonelectrical Equipment

250.118 Types of Equipment Grounding Conductors

250.119 Identification of Equipment Grounding Conductors

(A) Conductors 4 AWG and Larger

(B) Multiconductor Cable

(C) Flexible Cord

250.120 Equipment Grounding Conductor Installation

(A) Raceway, Cable Trays, Cable Armor, Cablebus, or Cable Sheaths

(B) Aluminum and Copper-Clad Aluminum Conductors

(C) Equipment Grounding Conductors Smaller Than 6 AWG

250.121 Use of Equipment Grounding Conductors

250.122 Size of Equipment Grounding Conductors

(A) General

(B) Increased in Size

(C) Multiple Circuits

(D) Motor Circuits

(E) Flexible Cord and Fixture Wire

(F) Conductors in Parallel

(G) Feeder Taps

250.124 Equipment Grounding Conductor Continuity

(A) Separable Connections

(B) Switches

250.126 Identification of Wiring Device Terminals

Part VII. Methods of Equipment Grounding

250.130 Equipment Grounding Conductor Connections

(A) For Grounded Systems

(B) For Ungrounded Systems

(C) Nongrounding Receptacle Replacement or Branch Circuit Extensions

250.132 Short Sections of Raceway

250.134 Equipment Fastened in Place or Connected by Permanent Wiring Methods (Fixed) — Grounding

(A) Equipment Grounding Conductor Types

(B) With Circuit Conductors

250.136 Equipment Considered Grounded

(A) Equipment Secured to Grounded Metal Supports

(B) Metal Car Frames

250.138 Cord-and-Plug-Connected Equipment

(A) By Means of an Equipment Grounding Conductor

(B) By Means of a Separate Flexible Wire or Strap

250.140 Frames of Ranges and Clothes Dryers

250.142 Use of Grounded Circuit Conductor for Grounding Equipment

250.144 Multiple Circuit Connections

250.146 Connecting Receptacle Grounding Terminal to Box

(A) Supply-Side Equipment

(B) Load-Side Equipment

(A) Surface-Mounted Box

(B) Contact Devices or Yokes

(C) Floor Boxes

(D) Isolated Ground Receptacles

250.148 Continuity and Attachment of Equipment Grounding Conductors to Boxes

(A) Connections

(B) Grounding Continuity

(C) Metal Boxes

(D) Nonmetallic Boxes

(E) Solder

Part VIII. Direct-Current Systems
### 2017 NEC Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>250.160</td>
<td>General</td>
</tr>
<tr>
<td>250.162</td>
<td>Direct-Current Circuits and Systems to Be Grounded</td>
</tr>
<tr>
<td>(A) Two-Wire, Direct-Current Systems</td>
<td></td>
</tr>
<tr>
<td>(B) Three-Wire, Direct-Current Systems</td>
<td></td>
</tr>
<tr>
<td>250.164</td>
<td>Point of Connection for Direct-Current Systems</td>
</tr>
<tr>
<td>(A) Off-Premises Source</td>
<td></td>
</tr>
<tr>
<td>(B) On-Premises Source</td>
<td></td>
</tr>
<tr>
<td>250.166</td>
<td>Size of the Direct-Current Grounding Electrode Conductor</td>
</tr>
<tr>
<td>(A) Not Smaller Than the Neutral Conductor</td>
<td></td>
</tr>
<tr>
<td>(B) Not Smaller Than the Largest Conductor</td>
<td></td>
</tr>
<tr>
<td>(C) Connected to Rod, Pipe, or Plate Electrodes</td>
<td></td>
</tr>
<tr>
<td>(D) Connected to a Concrete-Encased Electrode</td>
<td></td>
</tr>
<tr>
<td>(E) Connected to a Ground Ring</td>
<td></td>
</tr>
<tr>
<td>250.167</td>
<td>Direct-Current Ground-Fault Detection</td>
</tr>
<tr>
<td>(A) Ungrounded Systems</td>
<td></td>
</tr>
<tr>
<td>(B) Grounded Systems</td>
<td></td>
</tr>
<tr>
<td>(C) Marking</td>
<td></td>
</tr>
<tr>
<td>250.168</td>
<td>Direct-Current System Bonding Jumper</td>
</tr>
<tr>
<td>250.169</td>
<td>Ungrounded Direct-Current Separately Derived Systems</td>
</tr>
<tr>
<td>Part IX. Instruments, Meters, and Relays</td>
<td></td>
</tr>
<tr>
<td>250.170</td>
<td>Instrument Transformer Circuits</td>
</tr>
<tr>
<td>250.172</td>
<td>Instrument Transformer Cases</td>
</tr>
<tr>
<td>250.174</td>
<td>Cases of Instruments, Meters, and Relays Operating at 1000 Volts or Less</td>
</tr>
<tr>
<td>(A) Not on Switchgear or Switchboards</td>
<td></td>
</tr>
<tr>
<td>(B) On Switchgear or Dead-Front Switchboards</td>
<td></td>
</tr>
<tr>
<td>(C) On Live-Front Switchboards</td>
<td></td>
</tr>
<tr>
<td>250.176</td>
<td>Cases of Instruments, Meters, and Relays — Operating at 1000 Volts and Over</td>
</tr>
<tr>
<td>250.178</td>
<td>Instrument Equipment Grounding Conductor</td>
</tr>
<tr>
<td>Part X. Grounding of Systems and Circuits of over 1000 Volts</td>
<td></td>
</tr>
<tr>
<td>250.180</td>
<td>General</td>
</tr>
<tr>
<td>250.182</td>
<td>Derived Neutral Systems</td>
</tr>
<tr>
<td>250.184</td>
<td>Solidly Grounded Neutral Systems</td>
</tr>
<tr>
<td>(A) Neutral Conductor</td>
<td></td>
</tr>
<tr>
<td>(B) Single-Point Grounded Neutral System</td>
<td></td>
</tr>
<tr>
<td>(C) Multigrounded Neutral Systems</td>
<td></td>
</tr>
<tr>
<td>250.186</td>
<td>Grounding Service-Supplied Alternating-Current Systems</td>
</tr>
<tr>
<td>(A) Systems with a Grounded Conductor at the Service Point</td>
<td></td>
</tr>
<tr>
<td>(B) Systems Without a Grounded Conductor at the Service Point</td>
<td></td>
</tr>
<tr>
<td>250.187</td>
<td>Impedance Grounded Neutral Systems</td>
</tr>
<tr>
<td>(A) Location</td>
<td></td>
</tr>
<tr>
<td>(B) Identified and Insulated</td>
<td></td>
</tr>
<tr>
<td>(C) System Neutral Conductor Connection</td>
<td></td>
</tr>
<tr>
<td>(D) Equipment Grounding Conductors</td>
<td></td>
</tr>
<tr>
<td>250.188</td>
<td>Grounding of Systems Supplying Portable or Mobile Equipment</td>
</tr>
<tr>
<td>(A) Portable or Mobile Equipment</td>
<td></td>
</tr>
<tr>
<td>(B) Exposed Non–Current-Carrying Metal Parts</td>
<td></td>
</tr>
<tr>
<td>(C) Ground-Fault Current</td>
<td></td>
</tr>
<tr>
<td>(D) Ground-Fault Detection and Relaying</td>
<td></td>
</tr>
<tr>
<td>(E) Isolation</td>
<td></td>
</tr>
<tr>
<td>(F) Trailing Cable and Couplers</td>
<td></td>
</tr>
<tr>
<td>250.190</td>
<td>Grounding of Equipment</td>
</tr>
<tr>
<td>(A) Equipment Grounding</td>
<td></td>
</tr>
<tr>
<td>(B) Grounding Electrode Conductor</td>
<td></td>
</tr>
<tr>
<td>(C) Equipment Grounding Conductor</td>
<td></td>
</tr>
</tbody>
</table>
| 250.191 | Grounding System at Alternating-Current
Substations
250.194 Grounding and Bonding of Fences and Other Metal Structures
(A) Metal Fences
(B) Metal Structures

**Article 280 Surge Arresters, Over 1000 Volts**

Part I. General
280.1 Scope
280.3 Number Required
280.4 Surge Arrester Selection
(A) Rating
(B) Silicon Carbide Types

Part II. Installation
280.12 Uses Not Permitted
280.14 Routing of Surge Arrester Grounding Conductors

Part III. Connecting Surge Arresters
280.21 Connection
280.23 Surge-Arrester Conductors
280.24 Interconnections
(A) Metal Interconnections
(B) Through Spark Gap or Device
(C) By Special Permission
280.25 Grounding Electrode Conductor Connections and Enclosures

**Article 285 Surge-Protective Devices (SPDs), 1000 Volts or Less**

Part I. General
285.1 Scope
285.3 Uses Not Permitted
285.4 Number Required
285.6 Listing
285.7 Short-Circuit Current Rating

Part II. Installation
285.11 Location
285.12 Routing of Connections
285.13 Type 4 and Other Component Type SPDs
Part III. Connecting SPDs
285.21 Connection
285.23 Type 1 SPDs
(A) Installation
(B) At the Service
285.24 Type 2 SPDs
(A) Service-Supplied Building or Structure
(B) Feeder-Supplied Building or Structure
(C) Separately Derived System
285.25 Type 3 SPDs
285.26 Conductor Size
285.27 Connection Between Conductors
285.28 Grounding Electrode Conductor Connections and Enclosures

**Article 300 General Requirements for Wiring Methods and Materials**

Part I. General Requirements
300.1 Scope
(A) All Wiring Installations
(B) Integral Parts of Equipment
(C) Metric Designators and Trade Sizes
300.2 Limitations
(A) Voltage
(B) Temperature
300.3 Conductors
(A) Single Conductors
(B) Conductors of the Same Circuit
(C) Conductors of Different Systems
300.4 Protection Against Physical Damage
(A) Cables and Raceways Through Wood Members
<table>
<thead>
<tr>
<th>2017 NEC TABLE OF CONTENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(B) Nonmetallic-Sheathed Cables and Electrical</td>
</tr>
<tr>
<td>Nonmetallic Tubing Through Metal Framing Members</td>
</tr>
<tr>
<td>(C) Cables Through Spaces Behind Panels</td>
</tr>
<tr>
<td>Designed to Allow Access</td>
</tr>
<tr>
<td>(D) Cables and Raceways Parallel to Framing Members and Furring Strips</td>
</tr>
<tr>
<td>(E) Cables, Raceways, or Boxes Installed in or Under Roof Decking</td>
</tr>
<tr>
<td>(F) Cables and Raceways Installed in Shallow Grooves</td>
</tr>
<tr>
<td>(G) Insulated Fittings</td>
</tr>
<tr>
<td>(H) Structural Joints</td>
</tr>
<tr>
<td>300.5 Underground Installations</td>
</tr>
<tr>
<td>(A) Minimum Cover Requirements</td>
</tr>
<tr>
<td>(B) Wet Locations</td>
</tr>
<tr>
<td>(C) Underground Cables and Conductors Under Buildings</td>
</tr>
<tr>
<td>(D) Protection from Damage</td>
</tr>
<tr>
<td>(E) Splices and Taps</td>
</tr>
<tr>
<td>(F) Backfill</td>
</tr>
<tr>
<td>(G) Raceway Seals</td>
</tr>
<tr>
<td>(H) Bushing</td>
</tr>
<tr>
<td>(I) Conductors of the Same Circuit</td>
</tr>
<tr>
<td>(J) Earth Movement</td>
</tr>
<tr>
<td>(K) Directional Boring</td>
</tr>
<tr>
<td>300.6 Protection Against Corrosion and Deterioration</td>
</tr>
<tr>
<td>(A) Ferrous Metal Equipment</td>
</tr>
<tr>
<td>(B) Aluminum Metal Equipment</td>
</tr>
<tr>
<td>(C) Nonmetallic Equipment</td>
</tr>
<tr>
<td>(D) Indoor Wet Locations</td>
</tr>
<tr>
<td>300.7 Raceways Exposed to Different Temperatures</td>
</tr>
<tr>
<td>(A) Sealing</td>
</tr>
<tr>
<td>(B) Expansion, Expansion-Deflection, and Deflection Fittings</td>
</tr>
<tr>
<td>300.8 Installation of Conductors with Other Systems</td>
</tr>
</tbody>
</table>
### 2017 NEC Table of Contents

<table>
<thead>
<tr>
<th>Article 300.18</th>
<th>Raceway Installations</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A)</td>
<td>Complete Runs</td>
</tr>
<tr>
<td>(B)</td>
<td>Welding</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Article 300.19</th>
<th>Supporting Conductors in Vertical Raceways</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A)</td>
<td>Spacing Intervals — Maximum</td>
</tr>
<tr>
<td>(B)</td>
<td>Fire-Rated Cables and Conductors</td>
</tr>
<tr>
<td>(C)</td>
<td>Support Methods</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Article 300.20</th>
<th>Induced Currents in Ferrous Metal Enclosures or Ferrous Metal Raceways</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A)</td>
<td>Conductors Grouped Together</td>
</tr>
<tr>
<td>(B)</td>
<td>Individual Conductors</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Article 300.21</th>
<th>Spread of Fire or Products of Combustion</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Article 300.22</th>
<th>Wiring in Ducts Not Used for Air Handling, Fabricated Ducts for Environmental Air, and Other Spaces for Environmental Air (Plenums)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A)</td>
<td>Ducts for Dust, Loose Stock, or Vapor Removal</td>
</tr>
<tr>
<td>(B)</td>
<td>Ducts Specifically Fabricated for Environmental Air</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Article 300.23</th>
<th>Panels Designed to Allow Access</th>
</tr>
</thead>
</table>

| Article 300.31 | Covers Required |

| Article 300.32 | Conductors of Different Systems |

| Article 300.34 | Conductor Bending Radius |

| Article 300.35 | Protection Against Induction Heating |

| Article 300.37 | Aboveground Wiring Methods |

| Article 300.38 | Raceways in Wet Locations Above Grade |

| Article 300.39 | Braid-Covered Insulated Conductors — Exposed Installation |

| Article 300.40 | Insulation Shielding |

| Article 300.42 | Moisture or Mechanical Protection for MetalSheathed |

| Article 300.45 | Warning Signs |

<table>
<thead>
<tr>
<th>Article 300.50</th>
<th>Underground Installations (A) General</th>
</tr>
</thead>
<tbody>
<tr>
<td>(B)</td>
<td>Wet Locations</td>
</tr>
<tr>
<td>(C)</td>
<td>Protection from Damage</td>
</tr>
<tr>
<td>(D)</td>
<td>Splices</td>
</tr>
<tr>
<td>(E)</td>
<td>Backfill</td>
</tr>
<tr>
<td>(F)</td>
<td>Raceway Seal</td>
</tr>
</tbody>
</table>

### Article 310 Conductors for General Wiring

| Part I. General |

<table>
<thead>
<tr>
<th>Article 310.1</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Article 310.2</td>
<td>Definitions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part II. Installation</th>
</tr>
</thead>
</table>

| Article 310.10 | Uses Permitted (A) Dry Locations |

| Part II. Requirements for over 1000 Volts, Nominal |

<table>
<thead>
<tr>
<th>Article 310.15</th>
<th>Ampacities for Conductors Rated 0–2000 Volts (A) General</th>
</tr>
</thead>
<tbody>
<tr>
<td>(B)</td>
<td>Tables</td>
</tr>
<tr>
<td>(C)</td>
<td>Engineering Supervision</td>
</tr>
</tbody>
</table>

| Part III. Construction Specifications |

<table>
<thead>
<tr>
<th>Article 310.60</th>
<th>Conductors Rated 2001 to 35,000 Volts (A) Ampacities of Conductors Rated 2001 to 35,000 Volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>(B)</td>
<td>Engineering Supervision</td>
</tr>
<tr>
<td>(C)</td>
<td>Tables</td>
</tr>
</tbody>
</table>

| Article 335.60 | Overhead Wiring Methods (A) General |

<table>
<thead>
<tr>
<th>Article 350.10</th>
<th>Covers Required</th>
</tr>
</thead>
</table>

| Article 350.32 | Conductors of Different Systems |

| Article 350.34 | Conductor Bending Radius |

| Article 350.35 | Protection Against Induction Heating |

| Article 350.37 | Aboveground Wiring Methods |

| Article 350.38 | Raceways in Wet Locations Above Grade |

| Article 350.39 | Braid-Covered Insulated Conductors — Exposed Installation |

| Article 350.40 | Insulation Shielding |

| Article 350.42 | Moisture or Mechanical Protection for MetalSheathed |

| Article 350.45 | Warning Signs |

<table>
<thead>
<tr>
<th>Article 350.50</th>
<th>Underground Installations (A) General</th>
</tr>
</thead>
<tbody>
<tr>
<td>(B)</td>
<td>Wet Locations</td>
</tr>
<tr>
<td>(C)</td>
<td>Protection from Damage</td>
</tr>
<tr>
<td>(D)</td>
<td>Splices</td>
</tr>
<tr>
<td>(E)</td>
<td>Backfill</td>
</tr>
<tr>
<td>(F)</td>
<td>Raceway Seal</td>
</tr>
</tbody>
</table>

### Part I. General

<table>
<thead>
<tr>
<th>Article 310.1</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Article 310.2</td>
<td>Definitions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part II. Installation</th>
</tr>
</thead>
</table>

| Article 310.10 | Uses Permitted (A) Dry Locations |

<table>
<thead>
<tr>
<th>Part II. Requirements for over 1000 Volts, Nominal</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Article 310.15</th>
<th>Ampacities for Conductors Rated 0–2000 Volts (A) General</th>
</tr>
</thead>
<tbody>
<tr>
<td>(B)</td>
<td>Tables</td>
</tr>
<tr>
<td>(C)</td>
<td>Engineering Supervision</td>
</tr>
</tbody>
</table>

| Part III. Construction Specifications |

<table>
<thead>
<tr>
<th>Article 310.60</th>
<th>Conductors Rated 2001 to 35,000 Volts (A) Ampacities of Conductors Rated 2001 to 35,000 Volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>(B)</td>
<td>Engineering Supervision</td>
</tr>
<tr>
<td>(C)</td>
<td>Tables</td>
</tr>
<tr>
<td>Article</td>
<td>Section</td>
</tr>
<tr>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>310</td>
<td>310.104</td>
</tr>
<tr>
<td>310</td>
<td>310.106</td>
</tr>
<tr>
<td>310</td>
<td>(A)</td>
</tr>
<tr>
<td>310</td>
<td>(B)</td>
</tr>
<tr>
<td>310</td>
<td>(C)</td>
</tr>
<tr>
<td>310</td>
<td>(D)</td>
</tr>
<tr>
<td>310</td>
<td>310.110</td>
</tr>
<tr>
<td>310</td>
<td>(A)</td>
</tr>
<tr>
<td>310</td>
<td>(B)</td>
</tr>
<tr>
<td>310</td>
<td>(C)</td>
</tr>
<tr>
<td>310</td>
<td>310.120</td>
</tr>
<tr>
<td>310</td>
<td>(A)</td>
</tr>
<tr>
<td>310</td>
<td>(B)</td>
</tr>
<tr>
<td>310</td>
<td>(C)</td>
</tr>
<tr>
<td>310</td>
<td>(D)</td>
</tr>
<tr>
<td>312</td>
<td>Article 312</td>
</tr>
<tr>
<td>312</td>
<td>Part I. Scope and Installation</td>
</tr>
<tr>
<td>312</td>
<td>312.1</td>
</tr>
<tr>
<td>312</td>
<td>312.2</td>
</tr>
<tr>
<td>312</td>
<td>312.3</td>
</tr>
<tr>
<td>312</td>
<td>312.4</td>
</tr>
<tr>
<td>312</td>
<td>312.5</td>
</tr>
<tr>
<td>312</td>
<td>(A)</td>
</tr>
<tr>
<td>312</td>
<td>(B)</td>
</tr>
<tr>
<td>312</td>
<td>(C)</td>
</tr>
<tr>
<td>312</td>
<td>312.6</td>
</tr>
<tr>
<td>312</td>
<td>(A)</td>
</tr>
<tr>
<td>312</td>
<td>(B)</td>
</tr>
<tr>
<td>312</td>
<td>(C)</td>
</tr>
<tr>
<td>312</td>
<td>312.7</td>
</tr>
<tr>
<td>312</td>
<td>312.8</td>
</tr>
<tr>
<td>312</td>
<td>Article 314</td>
</tr>
<tr>
<td>312</td>
<td>Part I. Scope and General</td>
</tr>
<tr>
<td>312</td>
<td>314.1</td>
</tr>
<tr>
<td>312</td>
<td>314.2</td>
</tr>
<tr>
<td>312</td>
<td>314.3</td>
</tr>
<tr>
<td>312</td>
<td>314.4</td>
</tr>
<tr>
<td>312</td>
<td>Part II. Installation</td>
</tr>
<tr>
<td>312</td>
<td>314.15</td>
</tr>
<tr>
<td>312</td>
<td>314.16</td>
</tr>
<tr>
<td>312</td>
<td>(A)</td>
</tr>
<tr>
<td>312</td>
<td>(B)</td>
</tr>
<tr>
<td>312</td>
<td>(C)</td>
</tr>
<tr>
<td>312</td>
<td>314.17</td>
</tr>
<tr>
<td>312</td>
<td>(A)</td>
</tr>
<tr>
<td>312</td>
<td>(B)</td>
</tr>
<tr>
<td>312</td>
<td>(C)</td>
</tr>
</tbody>
</table>
(D) Conductors 4 AWG or Larger
314.19 Boxes Enclosing Flush Devices
314.20 Flush-Mounted Installations
314.21 Repairing Noncombustible Surfaces
314.22 Surface Extensions
314.23 Supports
(A) Surface Mounting
(B) Structural Mounting
(C) Mounting in Finished Surfaces
(D) Suspended Ceilings
(E) Raceway-Supported Enclosure, Without Devices, Luminaires, or Lampholders
(F) Raceway-Supported Enclosures, with Devices, Luminaires, or Lampholders
(G) Enclosures in Concrete or Masonry
(H) Pendant Boxes
314.24 Depth of Boxes
(A) Outlet Boxes Without Enclosed Devices or Utilization Equipment
(B) Outlet and Device Boxes with Enclosed Devices or Utilization Equipment
314.25 Covers and Canopies
(A) Nonmetallic or Metal Covers and Plates
(B) Exposed Combustible Wall or Ceiling Finish
(C) Flexible Cord Pendants
314.27 Outlet Boxes
(A) Boxes at Luminaire or Lampholder Outlets
(B) Floor Boxes
(C) Boxes at Ceiling-Suspended (Paddle) Fan Outlets
(D) Utilization Equipment
(E) Separable Attachment Fittings
314.28 Pull and Junction Boxes and Conduit Bodies
(A) Minimum Size
(B) Conductors in Pull or Junction Boxes
(C) Covers
(D) Permanent Barriers
(E) Power Distribution Blocks
314.29 Boxes, Conduit Bodies, and Handhole Enclosures to Be Accessible
314.30 Handhole Enclosures
(A) Size
(B) Wiring Entries
(C) Enclosed Wiring
(D) Covers
Part III. Construction Specifications
314.40 Metal Boxes, Conduit Bodies, and Fittings
(A) Corrosion Resistant
(B) Thickness of Metal
(C) Metal Boxes Over 1650 cm3 (100 in.3)
(D) Grounding Provisions
314.41 Covers
314.42 Bushings
314.43 Nonmetallic Boxes
314.44 Marking
Part IV. Pull and Junction Boxes, Conduit Bodies, and Handhole Enclosures for Use on Systems over 1000 Volts, Nominal
314.70 General
(A) Pull and Junction Boxes
(B) Conduit Bodies
(C) Handhole Enclosures
314.71 Size of Pull and Junction Boxes, Conduit Bodies, and Handhole Enclosures
(A) For Straight Pulls
(B) For Angle or U Pulls
2017 NEC TABLE OF CONTENTS

(C) Removable Sides
314.72 Construction and Installation Requirements
(A) Corrosion Protection
(B) Passing Through Partitions
(C) Complete Enclosure
(D) Wiring Is Accessible
(E) Suitable Covers
(F) Suitable for Expected Handling

Article 320 Armored Cable: Type AC

Part I. General
320.1 Scope
320.2 Definition
320.6 Listing Requirements

Part II. Installation
320.10 Uses Permitted
320.12 Uses Not Permitted
320.15 Exposed Work
320.17 Through or Parallel to Framing Members
320.23 In Accessible Attics
(A) Cables Run Across the Top of Floor Joists
(B) Cable Installed Parallel to Framing Members
320.24 Bending Radius
320.30 Securing and Supporting
(A) General
(B) Securing
(C) Supporting
(D) Unsupported Cables
320.40 Boxes and Fittings
320.80 Ampacity
(A) Thermal Insulation
(B) Cable Tray
Part III. Construction Specifications
320.100 Construction
320.104 Conductors
320.108 Equipment Grounding Conductor
320.120 Marking

Article 322 Flat Cable Assemblies: Type FC

Part I. General
322.1 Scope
322.2 Definition
322.6 Listing Requirements

Part II. Installation
322.10 Uses Permitted
322.12 Uses Not Permitted
322.30 Securing and Supporting
322.40 Boxes and Fittings
322.56 Splices and Taps
(A) Splices
(B) Taps
Part III. Construction Specifications
322.100 Construction
322.104 Conductors
322.112 Insulation
322.120 Marking
(A) Temperature Rating
(B) Identification of Grounded Conductor
(C) Terminal Block Identification

Article 324 Flat Conductor Cable: Type FCC

Part I. General
324.1 Scope
324.2 Definitions
Part III. Construction Specifications
324.100 Construction
324.6 Listing Requirements
Part II. Installation

324.10 Uses Permitted
(A) Branch Circuits
(B) Branch-Circuit Ratings
(C) Floors
(D) Walls
(E) Damp Locations
(F) Heated Floors
(G) System Height

324.12 Uses Not Permitted

324.18 Crossings

324.20 Securing and Supporting

324.40 Boxes and Fittings
(A) Cable Connections and Insulating Ends
(B) Polarization of Connections
(C) Shields
(D) Connection to Other Systems
(E) Metal-Shield Connectors

324.41 Floor Coverings

324.42 Devices
(A) Receptacles
(B) Receptacles and Housings

324.56 Splices and Taps
(A) FCC Systems Alterations
(B) Transition Assemblies

324.60 Grounding

Part III. Construction Specifications

324.100 Construction
(A) Type FCC Cable
(B) Shields

324.101 Corrosion Resistance

324.112 Insulation

324.120 Markings

Article 326 Integrated Gas Spacer Cable: Type IGS

Part I. General

326.1 Scope

326.2 Definition

Part II. Installation

326.10 Uses Permitted

326.12 Uses Not Permitted

326.24 Bending Radius

326.26 Bends

326.40 Fittings

326.80 Ampacity

Part III. Construction Specifications

326.104 Conductors

326.112 Insulation

326.116 Conduit

326.120 Marking

Article 328 Medium Voltage Cable: Type MV

Part I. General

328.1 Scope

328.2 Definition

328.6 Listing Requirements

Part II. Installation

328.10 Uses Permitted

328.12 Uses Not Permitted

328.14 Installation

328.30 Support

328.80 Ampacity

Part III. Construction Specifications

328.100 Construction

328.120 Marking

Article 330 Metal-Clad Cable: Type MC
<table>
<thead>
<tr>
<th>Article</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>330.10</td>
<td>Uses Permitted</td>
</tr>
<tr>
<td>330.12</td>
<td>Uses Not Permitted</td>
</tr>
<tr>
<td>330.15</td>
<td>Exposed Work</td>
</tr>
<tr>
<td>330.17</td>
<td>Through or Parallel to Framing Members</td>
</tr>
<tr>
<td>330.24</td>
<td>Bending Radius</td>
</tr>
<tr>
<td>330.30</td>
<td>Securing and Supporting</td>
</tr>
<tr>
<td>330.31</td>
<td>Single Conductors</td>
</tr>
<tr>
<td>330.80</td>
<td>Ampacity</td>
</tr>
<tr>
<td>330.104</td>
<td>Conductors</td>
</tr>
<tr>
<td>330.108</td>
<td>Equipment Grounding Conductor</td>
</tr>
<tr>
<td>330.112</td>
<td>Insulation</td>
</tr>
<tr>
<td>332.10</td>
<td>Uses Permitted</td>
</tr>
<tr>
<td>332.12</td>
<td>Uses Not Permitted</td>
</tr>
<tr>
<td>332.17</td>
<td>Through or Parallel to Framing Members</td>
</tr>
<tr>
<td>332.24</td>
<td>Bending Radius</td>
</tr>
<tr>
<td>332.30</td>
<td>Securing and Supporting</td>
</tr>
<tr>
<td>332.31</td>
<td>Single Conductors</td>
</tr>
<tr>
<td>332.40</td>
<td>Boxes and Fittings</td>
</tr>
<tr>
<td>332.80</td>
<td>Ampacity</td>
</tr>
<tr>
<td>332.104</td>
<td>Conductors</td>
</tr>
<tr>
<td>332.108</td>
<td>Equipment Grounding Conductor</td>
</tr>
<tr>
<td>332.112</td>
<td>Insulation</td>
</tr>
<tr>
<td>332.116</td>
<td>Sheath</td>
</tr>
<tr>
<td>334.1</td>
<td>Scope</td>
</tr>
<tr>
<td>334.2</td>
<td>Definitions</td>
</tr>
<tr>
<td>334.6</td>
<td>Listing Requirements</td>
</tr>
</tbody>
</table>

**Cable: Type MI**

<table>
<thead>
<tr>
<th>Article</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>332.10</td>
<td>Uses Permitted</td>
</tr>
<tr>
<td>332.12</td>
<td>Uses Not Permitted</td>
</tr>
<tr>
<td>332.17</td>
<td>Through or Parallel to Framing Members</td>
</tr>
<tr>
<td>332.24</td>
<td>Bending Radius</td>
</tr>
<tr>
<td>332.30</td>
<td>Securing and Supporting</td>
</tr>
<tr>
<td>332.31</td>
<td>Single Conductors</td>
</tr>
<tr>
<td>332.40</td>
<td>Boxes and Fittings</td>
</tr>
<tr>
<td>332.80</td>
<td>Ampacity</td>
</tr>
<tr>
<td>332.104</td>
<td>Conductors</td>
</tr>
<tr>
<td>332.108</td>
<td>Equipment Grounding Conductor</td>
</tr>
<tr>
<td>332.112</td>
<td>Insulation</td>
</tr>
<tr>
<td>332.116</td>
<td>Sheath</td>
</tr>
</tbody>
</table>

**Article 334 Nonmetallic-Sheathed Cable:**

**Types NM, NMC, and NMS**

<table>
<thead>
<tr>
<th>Article</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>334.1</td>
<td>Scope</td>
</tr>
<tr>
<td>334.2</td>
<td>Definitions</td>
</tr>
<tr>
<td>334.6</td>
<td>Listing Requirements</td>
</tr>
</tbody>
</table>

**Article 332 Mineral-Insulated, Metal-Sheathed**

<table>
<thead>
<tr>
<th>Article</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>332.1</td>
<td>Scope</td>
</tr>
<tr>
<td>332.2</td>
<td>Definition</td>
</tr>
<tr>
<td>332.6</td>
<td>Listing Requirements</td>
</tr>
<tr>
<td>332.10</td>
<td>Uses Permitted</td>
</tr>
<tr>
<td>332.12</td>
<td>Uses Not Permitted</td>
</tr>
<tr>
<td>332.17</td>
<td>Through or Parallel to Framing Members</td>
</tr>
<tr>
<td>332.24</td>
<td>Bending Radius</td>
</tr>
<tr>
<td>332.30</td>
<td>Securing and Supporting</td>
</tr>
<tr>
<td>332.31</td>
<td>Single Conductors</td>
</tr>
<tr>
<td>332.40</td>
<td>Boxes and Fittings</td>
</tr>
<tr>
<td>332.80</td>
<td>Ampacity</td>
</tr>
<tr>
<td>332.104</td>
<td>Conductors</td>
</tr>
<tr>
<td>332.108</td>
<td>Equipment Grounding Conductor</td>
</tr>
<tr>
<td>332.112</td>
<td>Insulation</td>
</tr>
<tr>
<td>332.116</td>
<td>Sheath</td>
</tr>
</tbody>
</table>
### Article 334 Power and Control Tray Cable: Type TC

- **334.10 Uses Permitted**
  - (A) Type NM
  - (B) Type NMC
  - (C) Type NMS

- **334.12 Uses Not Permitted**
  - (A) Types NM, NMC, and NMS
  - (B) Types NM and NMS

- **334.15 Exposed Work**
  - (A) To Follow Surface
  - (B) Protection from Physical Damage
  - (C) In Unfinished Basements and Crawl Spaces

- **334.17 Through or Parallel to Framing Members**

- **334.23 In Accessible Attics**

- **334.24 Bending Radius**

- **334.30 Securing and Supporting**
  - (A) Horizontal Runs Through Holes and Notches
  - (B) Unsupported Cables
  - (C) Wiring Device Without a Separate Outlet Box

- **334.40 Boxes and Fittings**
  - (A) Boxes of Insulating Material
  - (B) Devices of Insulating Material
  - (C) Devices with Integral Enclosures

- **334.80 Ampacity**

### Part III. Construction Specifications

- **334.100 Construction**
- **334.104 Conductors**
- **334.112 Equipment Grounding Conductor**
- **334.116 Sheath**
- **334.120 Marking**

---

### Article 336 Power and Control Tray Cable: Type TC

- **336.1 Scope**
- **336.2 Definition**
- **336.6 Listing Requirements**

### Part II. Installation

- **336.10 Uses Permitted**
- **336.12 Uses Not Permitted**
- **336.24 Bending Radius**

### Part III. Construction Specifications

- **336.100 Construction**
- **336.104 Conductors**
- **336.116 Jacket**
- **336.120 Marking**

---

### Article 338 Service-Entrance Cable: Types SE and USE

- **338.1 Scope**
- **338.2 Definitions**
- **338.6 Listing Requirements**

### Part II. Installation

- **338.10 Uses Permitted**
  - (A) Service-Entrance Conductors
  - (B) Branch Circuits or Feeders

- **338.12 Uses Not Permitted**
  - (A) Service-Entrance Cable
  - (B) Underground Service-Entrance Cable

- **338.24 Bending Radius**

### Part III. Construction Specifications

- **338.100 Construction**
- **338.104 Conductors**
- **338.108 Equipment Grounding Conductor**
- **338.112 Insulation**
- **338.116 Sheath**
- **338.120 Marking**

---

### Article 337 Service-Multiwire Cable: Types U and USE

- **337.1 Scope**
- **337.2 Definitions**
- **337.6 Listing Requirements**

### Part II. Installation

- **337.10 Uses Permitted**
  - (A) Service-Entrance Conductors
  - (B) Branch Circuits or Feeders

- **337.12 Uses Not Permitted**
  - (A) Service-Entrance Cable
  - (B) Underground Service-Entrance Cable

- **337.24 Bending Radius**

### Part III. Construction Specifications

- **337.100 Construction**
- **337.104 Conductors**
- **337.108 Equipment Grounding Conductor**
- **337.112 Insulation**
- **337.116 Sheath**
- **337.120 Marking**
### Article 340 Underground Feeder and Branch-Circuit Cable: Type UF

**Part I. General**
- 340.1 Scope
- 340.2 Definition
- 340.6 Listing Requirements

**Part II. Installation**
- 340.10 Uses Permitted
- 340.12 Uses Not Permitted
- 340.24 Bending Radius
- 340.80 Ampacity

**Part III. Construction Specifications**
- 340.104 Conductors
- 340.108 Equipment Grounding Conductor
- 340.112 Insulation
- 340.116 Sheath

### Article 342 Intermediate Metal Conduit: Type IMC

**Part I. General**
- 342.1 Scope
- 342.2 Definition
- 342.6 Listing Requirements

**Part II. Installation**
- 342.10 Uses Permitted
- 342.14 Dissimilar Metals
- 342.20 Size
- 342.22 Number of Conductors

**Part III. Construction Specifications**
- 342.120 Marking
- 342.130 Standard Lengths

### Article 344 Rigid Metal Conduit: Type RMC

**Part I. General**
- 344.1 Scope
- 344.2 Definition
- 344.6 Listing Requirements

**Part II. Installation**
- 344.10 Uses Permitted
- 344.14 Dissimilar Metals
- 344.20 Size
- 344.22 Number of Conductors

**Part III. Construction Specifications**
- 344.24 Bends — How Made
2017 NEC TABLE OF CONTENTS

344.26 Bends — Number in One Run
348.42 Couplings and Connectors
348.56 Splices and Taps
348.60 Grounding and Bonding

Article 350 Liquidtight Flexible Metal Conduit: Type LFMC

Part I. General
350.1 Scope
350.2 Definition
350.6 Listing Requirements

Part II. Installation
350.10 Uses Permitted
350.12 Uses Not Permitted
350.20 Size
(A) Minimum
(B) Maximum
350.22 Number of Conductors or Cables
(A) Metric Designators 16 through 103
(Trade Sizes 1/2 through 4)
(B) Metric Designator 12 (Trade Size 3/8)
350.24 Bends — How Made
350.26 Bends — Number in One Run
350.28 Trimming
350.30 Securing and Supporting
(A) Securely Fastened
(B) Supports
350.42 Couplings and Connectors
350.56 Splices and Taps
350.60 Grounding and Bonding
Part III. Construction Specifications
350.120 Marking

Article 352 Rigid Polyvinyl Chloride Conduit: Type PVC

Part I. General
352.1 Scope

(A) Securely Fastened
(B) Supports
352.60 Grounding and Bonding
Part III. Construction Specifications
352.120 Marking
### Article 352 High Density Polyethylene Conduit:

#### Type HDPE Conduit

**Part I. General**

- 353.1 Scope
- 353.2 Definition
- 353.6 Listing Requirements

**Part II. Installation**

- 353.10 Uses Permitted
- 353.12 Uses Not Permitted
- 353.20 Size

- **(A) Hazardous (Classified) Locations**
- **(B) Support of Luminaires**
- **(C) Physical Damage**
- **(D) Ambient Temperatures**
- **(E) Theaters and Similar Locations**

- 353.22 Number of Conductors
- 353.24 Bends — How Made
- 353.26 Bends — Number in One Run
- 353.28 Trimming
- 353.46 Bushings
- 353.48 Joints
- 353.56 Splices and Taps
- 353.60 Grounding

**Part III. Construction Specifications**

- 353.100 Construction
- 353.120 Marking

### Article 354 Nonmetallic Underground Conduit with Conductors: Type NUCC

**Part I. General**

- 354.1 Scope
- 354.2 Definition
- 354.6 Listing Requirements

---

**Section Numbers**

- 352.2 Definition
- 352.6 Listing Requirements
- 352.10 Uses Permitted
  - **(A) Concealed**
  - **(B) Corrosive Influences**
  - **(C) Cinders**
  - **(D) Wet Locations**
  - **(E) Dry and Damp Locations**
  - **(F) Exposed**
  - **(G) Underground Installations**
  - **(H) Support of Conduit Bodies**
  - **(I) Insulation Temperature Limitations**
- 352.12 Uses Not Permitted
  - **(A) Hazardous (Classified) Locations**
  - **(B) Support of Luminaires**
  - **(C) Physical Damage**
  - **(D) Ambient Temperatures**
  - **(E) Theaters and Similar Locations**
- 352.20 Size
  - **(A) Minimum**
  - **(B) Maximum**
- 352.22 Number of Conductors
- 352.24 Bends — How Made
- 352.26 Bends — Number in One Run
- 352.28 Trimming
- 352.30 Securing and Supporting
  - **(A) Securely Fastened**
  - **(B) Supports**
- 352.44 Expansion Fittings
- 352.46 Bushings
- 352.48 Joints
- 352.56 Splices and Tap
- 352.60 Grounding

**Part III. Construction Specifications**

- 352.100 Construction
- 352.120 Marking

**Section Numbers**

- 353.1 Scope
- 353.2 Definition
- 353.6 Listing Requirements

**Part II. Installation**

- 353.10 Uses Permitted
- 353.12 Uses Not Permitted
- 353.20 Size

- **(A) Minimum**
- **(B) Maximum**
- 353.22 Number of Conductors
- 353.24 Bends — How Made
- 353.26 Bends — Number in One Run
- 353.28 Trimming
- 353.46 Bushings
- 353.48 Joints
- 353.56 Splices and Taps
- 353.60 Grounding

**Part III. Construction Specifications**

- 353.100 Construction
- 353.120 Marking

**Section Numbers**

- 354.1 Scope
- 354.2 Definition
- 354.6 Listing Requirements
<table>
<thead>
<tr>
<th>Article 362 Electrical Nonmetallic Tubing: Type ENT</th>
<th>Part I. General</th>
</tr>
</thead>
<tbody>
<tr>
<td>362.1 Scope</td>
<td>366.1 Scope</td>
</tr>
<tr>
<td>362.2 Definition</td>
<td>366.2 Definitions</td>
</tr>
<tr>
<td>362.6 Listing Requirements</td>
<td>366.6 Listing Requirements</td>
</tr>
<tr>
<td>Part II. Installation</td>
<td></td>
</tr>
<tr>
<td>362.10 Uses Permitted</td>
<td></td>
</tr>
<tr>
<td>362.12 Uses Not Permitted</td>
<td></td>
</tr>
<tr>
<td>362.20 Size</td>
<td>366.20 Conductors Connected in Parallel</td>
</tr>
<tr>
<td>(A) Minimum</td>
<td></td>
</tr>
<tr>
<td>(B) Maximum</td>
<td></td>
</tr>
<tr>
<td>362.22 Number of Conductors</td>
<td>366.22 Number of Conductors</td>
</tr>
<tr>
<td>(A) Sheet Metal Auxiliary Gutters</td>
<td></td>
</tr>
<tr>
<td>(B) Nonmetallic Auxiliary Gutters</td>
<td></td>
</tr>
<tr>
<td>362.24 Bends — How Made</td>
<td></td>
</tr>
<tr>
<td>362.26 Bends — Number in One Run</td>
<td></td>
</tr>
<tr>
<td>362.28 Trimming</td>
<td>366.44 Expansion Fittings</td>
</tr>
<tr>
<td>362.30 Securing and Supporting</td>
<td></td>
</tr>
<tr>
<td>(A) Securely Fastened</td>
<td>366.56 Splices and Taps</td>
</tr>
<tr>
<td>(B) Supports</td>
<td></td>
</tr>
<tr>
<td>362.46 Bushings</td>
<td>(A) Within Gutters</td>
</tr>
<tr>
<td>362.48 Joints</td>
<td>(B) Bare Conductors</td>
</tr>
<tr>
<td>362.56 Splices and Taps</td>
<td>(C) Suitably Identified</td>
</tr>
<tr>
<td>362.60 Grounding</td>
<td>(D) Overcurrent Protection</td>
</tr>
<tr>
<td>Part III. Construction Specifications</td>
<td></td>
</tr>
<tr>
<td>362.100 Construction</td>
<td>366.58 Insulated Conductors</td>
</tr>
<tr>
<td>362.120 Marking</td>
<td>(A) Deflected Insulated Conductors</td>
</tr>
<tr>
<td>Article 366 Auxiliary Gutters</td>
<td>(B) Auxiliary Gutters Used as Pull Boxes</td>
</tr>
</tbody>
</table>

| Part III. Construction Specifications            | 366.60 Grounding |
| 366.100 Construction                             |                  |

**Article 366 Auxiliary Gutters**

366.100 Construction
(A) Electrical and Mechanical Continuity
(B) Substantial Construction
(C) Smooth Rounded Edges
(D) Covers
(E) Clearance of Bare Live Parts

366.120 Marking

(A) Outdoors
(B) Indoors

**Article 368 Busways**

**Part I. General Requirements**

368.1 Scope
368.2 Definition

**Part II. Installation**

368.10 Uses Permitted
(A) Exposed
(B) Behind Access Panels
(C) Through Walls and Floors
368.12 Uses Not Permitted
(A) Physical Damage
(B) Hoistways
(C) Hazardous Locations
(D) Wet Locations
(E) Working Platform

368.17 Overcurrent Protection
(A) Rating of Overcurrent Protection — Feeders
(B) Reduction in Ampacity Size of Busway
(C) Feeder or Branch Circuits
(D) Rating of Overcurrent Protection — Branch Circuits

368.30 Support
368.56 Branches from Busways
(A) General
(B) Cord and Cable Assemblies

368.58 Dead Ends
368.60 Grounding
368.120 Marking

Part IV. Requirements for Over 1000 Volts, Nominal

368.214 Adjacent and Supporting Structures
368.234 Barriers and Seals

368.236 Drain Facilities
368.237 Ventilated Bus Enclosures
368.238 Terminations and Connections
368.239 Switches
368.240 Wiring 1000 Volts or Less, Nominal
368.244 Expansion Fittings
368.258 Neutral Conductor
368.260 Grounding
368.320 Marking

**Article 370 Cablebus**

**Part I. General**

370.1 Scope
370.2 Definition

**Part II. Installation**

370.10 Uses Permitted
(A) Transversely Routed
(B) Through Dry Floors and Platforms
(C) Through Floors and Platforms in Wet Locations

370.12 Uses Not Permitted

370.18 Cablebus Installation

370.20 Conductor Size and Termination
(A) Conductors
(B) Termination
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>370.22</td>
<td>Number of Conductors</td>
</tr>
<tr>
<td>370.23</td>
<td>Overcurrent Protection</td>
</tr>
<tr>
<td>370.30</td>
<td>Securing and Supporting</td>
</tr>
<tr>
<td>(A)</td>
<td>Cablebus Supports</td>
</tr>
<tr>
<td>(B)</td>
<td>Conductor Supports</td>
</tr>
<tr>
<td>370.42</td>
<td>Fittings</td>
</tr>
<tr>
<td>370.60</td>
<td>Grounding</td>
</tr>
<tr>
<td>370.80</td>
<td>Ampacity of Conductors</td>
</tr>
<tr>
<td>(A)</td>
<td>Ampacity of Single Insulated Conductors</td>
</tr>
<tr>
<td>(B)</td>
<td>Ampacity of Cables Rated 2000 Volts or Less</td>
</tr>
<tr>
<td>(C)</td>
<td>Ampacity of Type MV and Type MC Cables Rated 2001 Volts or Over</td>
</tr>
<tr>
<td>Part III. Construction Specifications</td>
<td></td>
</tr>
<tr>
<td>370.120</td>
<td>Marking</td>
</tr>
</tbody>
</table>

**Article 372 Cellular Concrete Floor Raceways**

| Part I. General | |
| 372.1 | Scope |
| 372.2 | Definitions |

| Part II. Installations | |
| 372.12 | Uses Not Permitted |
| 372.18 | Cellular Concrete Floor Raceways Installation |
| (A) | Header |
| (B) | Connection to Cabinets and Other Enclosures |
| (C) | Junction Boxes |
| (D) | Inserts |
| (E) | Markers |
| 372.20 | Size of Conductors |
| 372.22 | Maximum Number of Conductors in Raceway |
| Part III. Construction Specifications | |
| 372.100 | General |

**Article 374 Cellular Metal Floor Raceways**

| Part I. General | |
| 374.1 | Scope |
| 374.2 | Definitions |

| Part II. Installation | |
| 374.12 | Uses Not Permitted |
| 374.18 | Cellular Metal Floor Raceways Installations |
| (A) | Connection to Cabinets and Extensions from Cells |
| (B) | Junction Boxes |
| (C) | Inserts |
| (D) | Markers |
| 374.20 | Size of Conductors |
| 374.22 | Maximum Number of Conductors in Raceway |
| 374.23 | Ampacity of Conductors |
| 374.56 | Splices and Taps |
| 374.58 | Discontinued Outlets |

| Part III. Construction Specifications | |
| 374.100 | General |

**Article 376 Metal Wireways**

| Part I. General | |
| 376.1 | Scope |
| 376.2 | Definition |

| Part II. Installation | |
| 376.10 | Uses Permitted |
| 376.12 | Uses Not Permitted |
| 376.20 | Conductors Connected in Parallel |
| 376.21 | Size of Conductors |
| 376.22 | Number of Conductors and Ampacity |

| (A) | Cross-Sectional Areas of Wireway |
| (B) | Adjustment Factors |
| 376.23 | Insulated Conductors |
| 376.25 | Splices and Taps |
| 376.58 | Discontinued Outlets |

| Part III. Construction Specifications | |
| 376.30 | Securing and Supporting |

| (A) | Deflected Insulated Conductors |
| (B) | Metal Wireways Used as Pull Boxes |
(A) Horizontal Support

(B) Vertical Support

376.56 Splices, Taps, and Power Distribution Blocks

(A) Splices and Taps

(B) Power Distribution Blocks

376.58 Dead Ends

376.70 Extensions from Metal Wireways

Part III. Construction Specifications

376.100 Construction

(A) Electrical and Mechanical Continuity

(B) Substantial Construction

(C) Smooth Rounded Edges

(D) Covers

376.120 Marking

Article 378 Nonmetallic Wireways

Part I. General

378.1 Scope

378.2 Definition

378.6 Listing Requirements

Part II. Installation

378.10 Uses Permitted

378.12 Uses Not Permitted

378.20 Conductors Connected in Parallel

378.21 Size of Conductors

378.22 Number of Conductors

378.23 Insulated Conductors

(A) Deflected Insulated Conductors

(B) Nonmetallic Wireways Used as Pull Boxes

378.30 Securing and Supporting

(A) Horizontal Support

(B) Vertical Support

378.44 Expansion Fittings

378.56 Splices and Taps

378.58 Dead Ends

378.60 Grounding

378.70 Extensions from Nonmetallic Wireways

Part III. Construction Specifications

378.120 Marking

Article 380 Multioutlet Assembly

Part I. General

380.1 Scope

Part II. Installation

380.10 Uses Permitted

380.12 Uses Not Permitted

380.23 Insulated Conductors

(A) Deflected Insulated Conductors

(B) Multioutlet Assemblies Used as Pull Boxes

380.76 Metal Multioutlet Assembly Through Dry Partitions

Article 382 Nonmetallic Extensions

Part I. General

382.1 Scope

382.2 Definitions

382.6 Listing Requirements

Part II. Installation

382.10 Uses Permitted

(A) From an Existing Outlet

(B) Exposed and in a Dry Location

(C) Residential or Offices

382.12 Uses Not Permitted

382.15 Exposed

(A) Nonmetallic Extensions

(B) Concealable Nonmetallic Extensions

382.26 Bends

(A) Nonmetallic Extensions

(B) Concealable Nonmetallic Extensions
382.30 Securing and Supporting
(A) Nonmetallic Extensions
(B) Concealable Nonmetallic Extensions

382.40 Boxes and Fittings

382.42 Devices
(A) Receptacles
(B) Receptacles and Housings

382.56 Splices and Taps

Part III. Construction Specifications (Concealable Nonmetallic Extensions Only)

382.100 Construction

382.104 Flat Conductors
(A) Ungrounded Conductor (Center Layer)
(B) Grounded Conductor (Inner Sectioned Layers)
(C) Grounding Conductor (Outer Sectioned Layers)

382.112 Insulation

382.120 Marking
(A) Cable
(B) Conductor Identification

Article 384 Strut-Type Channel Raceway

Part I. General

384.1 Scope

384.2 Definition

384.6 Listing Requirements

Part II. Installation

384.10 Uses Permitted

384.12 Uses Not Permitted

384.21 Size of Conductors

384.22 Number of Conductors or Cables

384.30 Securing and Supporting
(A) Surface Mount
(B) Suspension Mount

384.56 Splices and Taps

384.60 Grounding

Part III. Construction Specifications

384.100 Construction
(A) Material
(B) Corrosion Protection
(C) Cover

384.120 Marking

Article 386 Surface Metal Raceways

Part I. General

386.1 Scope

386.2 Definition

386.6 Listing Requirements

Part II. Installation

386.10 Uses Permitted

386.12 Uses Not Permitted

386.21 Size of Conductors

386.22 Number of Conductors or Cables

386.30 Securing and Supporting

386.56 Splices and Taps

386.60 Grounding

386.70 Combination Raceways

Part III. Construction Specifications

386.100 Construction

386.120 Marking

Article 388 Surface Nonmetallic Raceways

Part I. General

388.1 Scope

388.2 Definition

388.6 Listing Requirements

Part II. Installation

388.10 Uses Permitted

388.12 Uses Not Permitted
<table>
<thead>
<tr>
<th>Article 388</th>
<th>Underfloor Raceways</th>
</tr>
</thead>
<tbody>
<tr>
<td>388.21 Size of Conductors</td>
<td>Part I. General</td>
</tr>
<tr>
<td>388.22 Number of Conductors or Cables</td>
<td>392.1 Scope</td>
</tr>
<tr>
<td>388.30 Securing and Supporting</td>
<td>392.2 Definition</td>
</tr>
<tr>
<td>388.56 Splices and Taps</td>
<td>Part II. Installation</td>
</tr>
<tr>
<td>388.60 Grounding</td>
<td>392.10 Uses Permitted</td>
</tr>
<tr>
<td>388.70 Combination Raceways</td>
<td>(A) Wiring Methods</td>
</tr>
<tr>
<td>Part III. Construction Specifications</td>
<td>(B) In Industrial Establishments</td>
</tr>
<tr>
<td>388.100 Construction</td>
<td>(C) Hazardous (Classified) Locations</td>
</tr>
<tr>
<td>388.120 Marking</td>
<td>(D) Nonmetallic Cable Tray</td>
</tr>
<tr>
<td>Article 390 Underfloor Raceways</td>
<td>(E) Airfield Lighting Cable Tray</td>
</tr>
<tr>
<td>390.1 Scope</td>
<td>392.12 Uses Not Permitted</td>
</tr>
<tr>
<td>390.2 Definition</td>
<td>392.18 Cable Tray Installation</td>
</tr>
<tr>
<td>390.3 Use</td>
<td>(A) Complete System</td>
</tr>
<tr>
<td>(A) Permitted</td>
<td>(B) Completed Before Installation</td>
</tr>
<tr>
<td>(B) Not Permitted</td>
<td>(C) Covers</td>
</tr>
<tr>
<td>390.4 Covering</td>
<td>(D) Through Partitions and Walls</td>
</tr>
<tr>
<td>(A) Raceways Not over 100 mm (4 in.) Wide</td>
<td>(E) Exposed and Accessible</td>
</tr>
<tr>
<td>(B) Raceways over 100 mm (4 in.) Wide But Not over 200 mm (8 in.) Wide</td>
<td>(F) Adequate Access</td>
</tr>
<tr>
<td>(C) Trench-Type Raceways Flush with Concrete</td>
<td>(G) Raceways, Cables, Boxes, and Conduit</td>
</tr>
<tr>
<td>(D) Other Raceways Flush with Concrete</td>
<td>Bodies Supported from Cable Tray Systems</td>
</tr>
<tr>
<td>390.5 Size of Conductors</td>
<td>(H) Marking</td>
</tr>
<tr>
<td>390.6 Maximum Number of Conductors in Raceway</td>
<td>392.20 Cable and Conductor Installation</td>
</tr>
<tr>
<td>390.7 Splices and Taps</td>
<td>(A) Multiconductor Cables Operating at 1000 Volts or Less</td>
</tr>
<tr>
<td>390.8 Discontinued Outlets</td>
<td>(B) Cables Operating at Over 1000 Volts</td>
</tr>
<tr>
<td>390.9 Laid in Straight Lines</td>
<td>(C) Connected in Parallel</td>
</tr>
<tr>
<td>390.10 Markers at Ends</td>
<td>(D) Single Conductors</td>
</tr>
<tr>
<td>390.11 Dead Ends</td>
<td>392.22 Number of Conductors or Cables</td>
</tr>
<tr>
<td>390.13 Junction Boxes</td>
<td>(A) Number of Multiconductor Cables, Rated 2000 Volts or Less, in Cable Trays</td>
</tr>
<tr>
<td>390.14 Inserts</td>
<td>(B) Number of Single-Conductor Cables, Rated 2000 Volts or Less, in Cable Trays</td>
</tr>
<tr>
<td>390.15 Connections to Cabinets and Wall Outlets</td>
<td>(C) Number of Type MV and Type MC Cables</td>
</tr>
<tr>
<td>390.17 Ampacity of Conductors</td>
<td></td>
</tr>
</tbody>
</table>
(2001 Volts or Over) in Cable Trays

392.30 Securing and Supporting
   (A) Cable Trays
   (B) Cables and Conductors

392.46 Bushed Conduit and Tubing

392.56 Cable Splices

392.60 Grounding and Bonding
   (A) Metal Cable Trays
   (B) Steel or Aluminum Cable Tray Systems
   (C) Transitions

392.80 Ampacity of Conductors
   (A) Ampacity of Cables, Rated 2000 Volts or Less, in Cable Trays
   (B) Ampacity of Type MV and Type MC Cables (2001 Volts or Over) in Cable Trays

Part III. Construction Specifications

392.100 Construction
   (A) Strength and Rigidity
   (B) Smooth Edges
   (C) Corrosion Protection
   (D) Side Rails
   (E) Fittings
   (F) Nonmetallic Cable Tray

**Article 393 Low-Voltage Suspended Ceiling Power Distribution Systems**

Part I. General

393.1 Scope

393.2 Definitions

393.6 Listing Requirements
   (A) Listed System
   (B) Assembly of Listed Parts

Part II. Installation

393.10 Uses Permitted

393.12 Uses Not Permitted

393.14 Installation
   (A) General Requirements
   (B) Insulated Conductors

393.21 Disconnecting Means
   (A) Location
   (B) Multiwire Branch Circuits

393.30 Securing and Supporting
   (A) Attached to Building Structure
   (B) Attachment of Power Grid Rails

393.40 Connectors and Enclosures

393.45 Overcurrent and Reverse Polarity (Backfeed) Protection
   (A) Overcurrent Protection
   (B) Interconnection of Power Sources
   (C) Reverse Polarity (Backfeed) Protection of Direct-Current Systems

393.56 Splices

393.57 Connections

393.60 Grounding
   (A) Grounding of Supply Side of Class 2 Power Source
   (B) Grounding of Load Side of Class 2 Power Source

Part III. Construction Specifications

393.104 Sizes and Types of Conductors
   (A) Load Side Utilization Conductor Size
   (B) Power Feed Bus Rail Conductor Size

**Article 394 Concealed Knob-and-Tube Wiring**

Part I. General

394.1 Scope

394.2 Definition

Part II. Installation
### Article 396 Messenger-Supported Wiring

#### Part I. General
- **396.1 Scope**
- **396.2 Definitions**

#### Part II. Installation
- **396.10 Uses Permitted**
  - **A** Cable Types
  - **B** In Industrial Establishments
  - **C** Hazardous (Classified) Locations
- **396.12 Uses Not Permitted**
- **396.30 Messenger**
  - **A** Support
  - **B** Neutral Conductor
  - **C** Equipment Grounding Conductor
- **396.56 Conductor Splices and Taps**

#### Part III. Construction Specifications
- **396.104 Conductors**

---

### Article 398 Open Wiring on Insulators

#### Part I. General
- **398.1 Scope**
- **398.2 Definition**

#### Part II. Installation
- **398.10 Uses Permitted**
  - **A** General
  - **B** Limited Conductor Space
  - **C** Clearance from Piping, Exposed Conductors, and So Forth
- **398.12 Uses Not Permitted**
  - **A** General
  - **B** Limited Conductor Space
  - **C** Clearance from Piping, Exposed Conductors, and So Forth

#### Part III. Construction Specifications
- **398.104 Conductors**

---

### Article 399 Outdoor Overhead Conductors over 1000 Volts

#### Part I. General
- **399.1 Scope**
- **399.2 Definition**

#### Part II. Installation
- **399.10 Uses Permitted**
- **399.30 Support**
(A) Conductors
(B) Structures
(C) Insulators

Article 400 Flexible Cords and Flexible Cables

Part I. General

400.1 Scope
400.2 Other Articles
400.3 Suitability
400.4 Types
400.5 Ampacities for Flexible Cords and Flexible Cables
(A) Ampacity Tables
(B) Ultimate Insulation Temperature
(C) Engineering Supervision
400.6 Markings
(A) Standard Markings
(B) Optional Markings
400.10 Uses Permitted
(A) Uses
(B) Attachment Plugs
400.12 Uses Not Permitted
400.13 Splices
400.14 Pull at Joints and Terminals
400.15 In Show Windows and Showcases
400.16 Overcurrent Protection
400.17 Protection from Damage

Part II. Construction Specifications

400.20 Labels
400.21 Construction
(A) Conductors
(B) Nominal Insulation Thickness
400.22 Grounded-Conductor Identification
(A) Colored Braid
(B) Tracer in Braid
400.23 Equipment Grounding Conductor Identification
(A) Colored Braid
(B) Colored Insulation or Covering
400.24 Attachment Plugs

Part III. Portable Cables Over 600 Volts, Nominal

400.30 Scope
400.31 Construction
(A) Conductors
(B) Equipment Grounding Conductor(s)
400.32 Shielding
400.33 Equipment Grounding Conductors
400.34 Minimum Bending Radii
400.35 Fittings
400.36 Splices and Terminations

Article 402 Fixture Wires

402.1 Scope
402.2 Other Articles
402.3 Types
402.5 Allowable Ampacities for Fixture Wires
402.6 Minimum Size
402.7 Number of Conductors in Conduit or Tubing
402.8 Grounded Conductor Identification
402.9 Marking
(A) Method of Marking
(B) Optional Marking
402.10 Uses Permitted
402.12 Uses Not Permitted
402.14 Overcurrent Protection

Article 404 Switches
### Part I. Installation

404.1 Scope

404.2 Switch Connections

(A) Three-Way and Four-Way Switches

(B) Grounded Conductors

(C) Switches Controlling Lighting Loads

404.3 Enclosure

(A) General

(B) Used as a Raceway

404.4 Damp or Wet Locations

(A) Surface-Mounted Switch or Circuit Breaker

(B) Flush-Mounted Switch or Circuit Breaker

(C) Switches in Tub or Shower Spaces

404.5 Time Switches, Flashers, and Similar Devices

404.6 Position and Connection of Switches

(A) Single-Throw Knife Switches

(B) Double-Throw Knife Switches

(C) Connection of Switches

404.7 Indicating

404.8 Accessibility and Grouping

(A) Location

(B) Voltage Between Adjacent Devices

(C) Multipole Snap Switches

404.9 Provisions for General-Use Snap Switches

(A) Faceplates

(B) Grounding

(C) Construction

404.10 Mounting of Snap Switches

(A) Surface Type

(B) Box Mounted

404.11 Circuit Breakers as Switches

404.12 Grounding of Enclosures

404.13 Knife Switches

### Part II. Construction Specifications

404.14 Rating and Use of Switches

(A) Alternating-Current General-Use Snap Switch

(B) Alternating-Current or Direct-Current General-Use Snap Switch

(C) CO/ALR Snap Switches

(D) Alternating-Current Specific-Use Snap Switches Rated for 347 Volts

(E) Dimmer Switches

(F) Cord- and Plug-Connected Loads

---

### Article 406 Receptacles, Cord Connectors, and Attachment Plugs (Caps)

406.1 Scope

406.2 Definitions

406.3 Receptacle Rating and Type

(A) Receptacles

(B) Rating

406.4 General Installation Requirements
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Grounding Type</td>
<td></td>
</tr>
<tr>
<td>(B) To Be Grounded</td>
<td></td>
</tr>
<tr>
<td>(C) Methods of Grounding</td>
<td></td>
</tr>
<tr>
<td>(D) Replacements</td>
<td></td>
</tr>
<tr>
<td>(E) Cord- and Plug-Connected Equipment</td>
<td></td>
</tr>
<tr>
<td>(F) Noninterchangeable Types</td>
<td></td>
</tr>
<tr>
<td>406.5 Receptacle Mounting</td>
<td></td>
</tr>
<tr>
<td>(A) Boxes That Are Set Back</td>
<td></td>
</tr>
<tr>
<td>(B) Boxes That Are Flush</td>
<td></td>
</tr>
<tr>
<td>(C) Receptacles Mounted on Covers</td>
<td></td>
</tr>
<tr>
<td>(D) Position of Receptacle Faces</td>
<td></td>
</tr>
<tr>
<td>(E) Receptacles in Countertops</td>
<td></td>
</tr>
<tr>
<td>(F) Receptacles in Work Surfaces</td>
<td></td>
</tr>
<tr>
<td>(G) Receptacle Orientation</td>
<td></td>
</tr>
<tr>
<td>(H) Receptacles in Seating Areas and Other Similar Surfaces</td>
<td></td>
</tr>
<tr>
<td>(I) Exposed Terminals</td>
<td></td>
</tr>
<tr>
<td>(J) Voltage Between Adjacent Devices</td>
<td></td>
</tr>
<tr>
<td>406.6 Receptacle Faceplates (Cover Plates)</td>
<td></td>
</tr>
<tr>
<td>(A) Thickness of Metal Faceplates</td>
<td></td>
</tr>
<tr>
<td>(B) Grounding</td>
<td></td>
</tr>
<tr>
<td>(C) Faceplates of Insulating Material</td>
<td></td>
</tr>
<tr>
<td>(D) Receptacle Faceplate (Cover Plates) with Integral Night Light and/or USB Charger</td>
<td></td>
</tr>
<tr>
<td>406.7 Attachment Plugs, Cord Connectors, and Flanged Surface Devices</td>
<td></td>
</tr>
<tr>
<td>(A) Construction of Attachment Plugs and Cord Connectors</td>
<td></td>
</tr>
<tr>
<td>(B) Connection of Attachment Plugs</td>
<td></td>
</tr>
<tr>
<td>(C) Attachment Plug Ejector Mechanisms</td>
<td></td>
</tr>
<tr>
<td>(D) Flanged Surface Inlet</td>
<td></td>
</tr>
<tr>
<td>406.8 Noninterchangeability</td>
<td></td>
</tr>
<tr>
<td>406.9 Receptacles in Damp or Wet Locations</td>
<td></td>
</tr>
<tr>
<td>(A) Damp Locations</td>
<td></td>
</tr>
<tr>
<td>(B) Wet Locations</td>
<td></td>
</tr>
<tr>
<td>406.10 Grounding-Type Receptacles, Adapters, Cord Connectors, and Attachment Plugs</td>
<td></td>
</tr>
<tr>
<td>(A) Grounding Poles</td>
<td></td>
</tr>
<tr>
<td>(B) Grounding-Pole Identification</td>
<td></td>
</tr>
<tr>
<td>(C) Grounding Terminal Use</td>
<td></td>
</tr>
<tr>
<td>(D) Grounding-Pole Requirements</td>
<td></td>
</tr>
<tr>
<td>(E) Use</td>
<td></td>
</tr>
<tr>
<td>406.11 Connecting Receptacle Grounding Terminal to Box</td>
<td></td>
</tr>
<tr>
<td>406.12 Tamper-Resistant Receptacles</td>
<td></td>
</tr>
<tr>
<td><strong>Article 408 Switchboards, Switchgear, and Panelboards</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Part I. General</strong></td>
<td></td>
</tr>
<tr>
<td>408.1 Scope</td>
<td></td>
</tr>
<tr>
<td>408.2 Other Articles</td>
<td></td>
</tr>
<tr>
<td>408.3 Support and Arrangement of Busbars and Conductors</td>
<td></td>
</tr>
<tr>
<td>(A) Conductors and Busbars on a Switchboard, Switchgear, or Panelboard</td>
<td></td>
</tr>
<tr>
<td>(B) Overheating and Inductive Effects</td>
<td></td>
</tr>
<tr>
<td>(C) Used as Service Equipment</td>
<td></td>
</tr>
<tr>
<td>(D) Terminals</td>
<td></td>
</tr>
<tr>
<td>(E) Bus Arrangement</td>
<td></td>
</tr>
<tr>
<td>(F) Switchboard, Switchgear, or Panelboard Identification</td>
<td></td>
</tr>
<tr>
<td>(G) Minimum Wire-Bending Space</td>
<td></td>
</tr>
<tr>
<td>408.4 Field Identification Required</td>
<td></td>
</tr>
<tr>
<td>408.5 Clearance for Conductor Entering Bus Enclosures</td>
<td></td>
</tr>
<tr>
<td>408.7 Unused Openings</td>
<td></td>
</tr>
<tr>
<td><strong>Part II. Switchboards and Switchgear</strong></td>
<td></td>
</tr>
</tbody>
</table>
408.16 Switchboards and Switchgear in Damp or Wet Locations

408.17 Location Relative to Easily Ignitible Material

408.18 Clearances

(A) From Ceiling

(B) Around Switchboards and Switchgear

408.19 Conductor Insulation

408.20 Location of Switchboards and Switchgear

408.22 Grounding of Instruments, Relays, Meters, and Instrument Transformers on Switchboards and Switchgear

Part III. Panelboards

408.30 General

408.36 Overcurrent Protection

(A) Snap Switches Rated at 30 Amperes or Less

(B) Supplied Through a Transformer

(C) Delta Breakers

(D) Back-Fed Devices

408.37 Panelboards in Damp or Wet Locations

408.38 Enclosure

408.39 Relative Arrangement of Switches and Fuses

408.40 Grounding of Panelboards

408.41 Grounded Conductor Terminations

Part IV. Construction Specifications

408.50 Panels

408.51 Busbars

408.52 Protection of Instrument Circuits

408.53 Component Parts

408.54 Maximum Number of Overcurrent Devices

408.55 Wire-Bending Space Within an Enclosure Containing a Panelboard

(A) Top and Bottom Wire-Bending Space

(B) Side Wire-Bending Space

408.56 Minimum Spacings

408.58 Panelboard Marking

Article 409 Industrial Control Panels

Part I. General

409.1 Scope

409.3 Other Articles

Part II. Installation

409.20 Conductor — Minimum Size and Ampacity

409.21 Overcurrent Protection

(A) General

(B) Location

(C) Rating

409.22 Short-Circuit Current Rating

(A) Installation

(B) Documentation

409.30 Disconnecting Means

409.60 Grounding

Part III. Construction Specifications

409.100 Enclosures

409.102 Busbars and Conductors

(A) Support and Arrangement

(B) Phase Arrangement

409.104 Wiring Space

(A) General

(B) Wire Bending Space

409.106 Spacings

409.108 Service Equipment

409.110 Marking

Article 410 Luminaires, Lampholders, and Lamps

Part I. General

410.1 Scope

410.2 Definition
2017 NEC Table of Contents

410.5 Live Parts
410.6 Listing Required
410.8 Inspection

Part II. Luminaires Locations
410.10 Luminaires in Specific Locations
(A) Wet and Damp Locations
(B) Corrosive Locations
(C) In Ducts or Hoods
(D) Bathtub and Shower Areas
(E) Luminaires in Indoor Sports, Mixed-Use, and All-Purpose Facilities
(F) Luminaires Installed in or Under Roof Decking

410.11 Luminaires Near Combustible Material
410.12 Luminaires over Combustible Material
410.14 Luminaires in Show Windows
410.16 Luminaires in Clothes Closets
(A) Luminaire Types Permitted
(B) Luminaire Types Not Permitted
(C) Location

410.18 Space for Cove Lighting

Part III. Provisions at Luminaires Outlet Boxes, Canopies, and Pans
410.20 Space for Conductors
410.21 Temperature Limit of Conductors in Outlet Boxes
410.22 Outlet Boxes to Be Covered
410.23 Covering of Combustible Material at Outlet Boxes
410.24 Connection of Electric-Discharge and LED Luminaires
(A) Independent of the Outlet Box
(B) Access to Boxes

Part IV. Luminaires Supports
410.30 Supports
(A) General

Part V. Grounding
410.40 General
410.42 Luminaire(s) with Exposed Conductive Parts
410.44 Methods of Grounding
410.46 Equipment Grounding Conductor Attachment

Part VI. Wiring of Luminaires
410.48 Luminaire Wiring — General
410.50 Polarization of Luminaires
410.52 Conductor Insulation
410.54 Pendant Conductors for Incandescent Filament Lamps
(A) Support
(B) Size
(C) Twisted or Cabled

410.56 Protection of Conductors and Insulation
(A) Properly Secured
(B) Protection Through Metal
(C) Luminaire Stems
(D) Splices and Taps
(E) Stranding
(F) Tension

410.59 Cord-Connected Showcases
(A) Cord Requirements
## 2017 NEC Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>(B)</td>
<td>Receptacles, Connectors, and Attachment Plugs</td>
</tr>
<tr>
<td>(C)</td>
<td>Support</td>
</tr>
<tr>
<td>(D)</td>
<td>No Other Equipment</td>
</tr>
<tr>
<td>(E)</td>
<td>Secondary Circuit(s)</td>
</tr>
<tr>
<td>410.62</td>
<td>Cord-Connected Lampholders and Luminaires</td>
</tr>
<tr>
<td>(A)</td>
<td>Lampholders</td>
</tr>
<tr>
<td>(B)</td>
<td>Adjustable Luminaires</td>
</tr>
<tr>
<td>(C)</td>
<td>Electric-Discharge and LED Luminaires</td>
</tr>
<tr>
<td>410.64</td>
<td>Luminaires as Raceways</td>
</tr>
<tr>
<td>(A)</td>
<td>Listed</td>
</tr>
<tr>
<td>(B)</td>
<td>Through-Wiring</td>
</tr>
<tr>
<td>(C)</td>
<td>Luminaires Connected Together</td>
</tr>
<tr>
<td>410.68</td>
<td>Feeder and Branch-Circuit Conductors and Ballasts</td>
</tr>
</tbody>
</table>

### Part VII. Construction of Luminaires

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.70</td>
<td>Combustible Shades and Enclosures</td>
</tr>
<tr>
<td>410.74</td>
<td>Luminaire Rating</td>
</tr>
<tr>
<td>(A)</td>
<td>Marking</td>
</tr>
<tr>
<td>(B)</td>
<td>Electrical Rating</td>
</tr>
<tr>
<td>410.82</td>
<td>Portable Luminaires</td>
</tr>
<tr>
<td>(A)</td>
<td>General</td>
</tr>
<tr>
<td>(B)</td>
<td>Portable Handlamps</td>
</tr>
<tr>
<td>410.84</td>
<td>Cord Bushings</td>
</tr>
</tbody>
</table>

### Part VIII. Installation of Lampholders

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.90</td>
<td>Screw Shell Type</td>
</tr>
<tr>
<td>410.93</td>
<td>Double-Pole Switched Lampholders</td>
</tr>
<tr>
<td>410.96</td>
<td>Lampholders in Wet or Damp Locations</td>
</tr>
<tr>
<td>410.97</td>
<td>Lampholders Near Combustible Material</td>
</tr>
</tbody>
</table>

### Part IX. Lamps and Auxiliary Equipment

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.103</td>
<td>Bases, Incandescent Lamps</td>
</tr>
<tr>
<td>410.104</td>
<td>Electric-Discharge Lamp Auxiliary Equipment</td>
</tr>
<tr>
<td>(A)</td>
<td>Enclosures</td>
</tr>
<tr>
<td>(B)</td>
<td>Switching</td>
</tr>
</tbody>
</table>

### Part X. Special Provisions for Flush and Recessed Luminaires

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.110</td>
<td>General</td>
</tr>
<tr>
<td>410.115</td>
<td>Temperature</td>
</tr>
<tr>
<td>(A)</td>
<td>Combustible Material</td>
</tr>
<tr>
<td>(B)</td>
<td>Fire-Resistant Construction</td>
</tr>
<tr>
<td>(C)</td>
<td>Recessed Incandescent Luminaires</td>
</tr>
<tr>
<td>410.116</td>
<td>Clearance and Installation</td>
</tr>
<tr>
<td>(A)</td>
<td>Clearance</td>
</tr>
<tr>
<td>(B)</td>
<td>Installation</td>
</tr>
<tr>
<td>410.117</td>
<td>Wiring</td>
</tr>
<tr>
<td>(A)</td>
<td>General</td>
</tr>
<tr>
<td>(B)</td>
<td>Circuit Conductors</td>
</tr>
<tr>
<td>(C)</td>
<td>Tap Conductors</td>
</tr>
</tbody>
</table>

### Part XI. Construction of Flush and Recessed Luminaires

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.118</td>
<td>Temperature</td>
</tr>
<tr>
<td>410.120</td>
<td>Lamp Wattage Marking</td>
</tr>
<tr>
<td>410.121</td>
<td>Solder Prohibited</td>
</tr>
<tr>
<td>410.122</td>
<td>Lampholders</td>
</tr>
</tbody>
</table>

### Part XII. Special Provisions for Electric-Discharge Lighting Systems of 1000 Volts or Less

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.130</td>
<td>General</td>
</tr>
<tr>
<td>(A)</td>
<td>Open-Circuit Voltage of 1000 Volts or Less</td>
</tr>
<tr>
<td>(B)</td>
<td>Considered as Energized</td>
</tr>
<tr>
<td>(C)</td>
<td>Transformers of the Oil-Filled Type</td>
</tr>
<tr>
<td>(D)</td>
<td>Additional Requirements</td>
</tr>
<tr>
<td>(E)</td>
<td>Thermal Protection — Fluorescent Luminaires</td>
</tr>
<tr>
<td>(F)</td>
<td>High-Intensity Discharge Luminaires</td>
</tr>
<tr>
<td>(G)</td>
<td>Disconnecting Means</td>
</tr>
<tr>
<td>410.134</td>
<td>Direct-Current Equipment</td>
</tr>
<tr>
<td>410.135</td>
<td>Open-Circuit Voltage Exceeding 300 Volts</td>
</tr>
<tr>
<td>410.136</td>
<td>Luminaire Mounting</td>
</tr>
<tr>
<td>(A)</td>
<td>Exposed Components</td>
</tr>
</tbody>
</table>
(B) Combustible Low-Density Cellulose Fiberboard

410.137 Equipment Not Integral with Luminaire

(A) Metal Cabinets

(B) Separate Mounting

(C) Wired Luminaire Sections

410.138 Autotransformers

410.139 Switches

Part XIII. Special Provisions for Electric-Discharge Lighting Systems of More than 1000 Volts

410.140 General

(A) Listing

(B) Dwelling Occupancies

(C) Live Parts

(D) Additional Requirements

410.141 Control

(A) Disconnection

(B) Within Sight or Locked Type

410.142 Lamp Terminals and Lampholders

410.143 Transformers

(A) Type

(B) Voltage

(C) Rating

(D) Secondary Connections

410.144 Transformer Locations

(A) Accessible

(B) Secondary Conductors

(C) Adjacent to Combustible Materials

410.145 Exposure to Damage

410.146 Marking

Part XIV. Lighting Track

410.151 Installation

(A) Lighting Track

(B) Connected Load

(C) Locations Not Permitted

(D) Support

410.153 Heavy-Duty Lighting Track

410.154 Fastening

410.155 Construction Requirements

(A) Construction

(B) Grounding

Part XV. Decorative Lighting and Similar Accessories

410.160 Listing of Decorative Lighting

Article 411 Low-Voltage Lighting

411.1 Scope

411.3 Low-Voltage Lighting Systems

411.4 Listing Required

(A) Listed System

(B) Assembly of Listed Parts

411.5 Specific Location Requirements

(A) Walls, Floors, and Ceilings

(B) Pools, Spas, Fountains, and Similar Locations

411.6 Secondary Circuits

(A) Grounding

(B) Isolation

(C) Bare Conductors

(D) Insulated Conductors

411.7 Branch Circuit

411.8 Hazardous (Classified) Locations

Article 422 Appliances

Part I. General

422.1 Scope

422.3 Other Articles

422.4 Live Parts

422.5 Ground-Fault Circuit-Interrupter (GFCI) Protection for Personnel

(A) General
(B) Type

422.6 Listing Required

Part II. Installation

422.10 Branch-Circuit Rating

(A) Individual Circuits

(B) Circuits Supplying Two or More Loads

422.11 Overcurrent Protection

(A) Branch-Circuit Overcurrent Protection

(B) Household-Type Appliances with Surface Heating Elements

(C) Infrared Lamp Commercial and Industrial Heating Appliances

(D) Open-Coil or Exposed Sheathed-Coil Types of Surface Heating Elements in Commercial-Type Heating Appliances

(E) Single Non–Motor-Operated Appliance

(F) Electric Heating Appliances Employing Resistance-Type Heating Elements Rated More Than 48 Amperes

(G) Motor-Operated Appliances

422.12 Central Heating Equipment

422.13 Storage-Type Water Heaters

422.15 Central Vacuum Outlet Assemblies

422.16 Flexible Cords

(A) General

(B) Specific Appliances

422.17 Protection of Combustible Material

422.18 Support of Ceiling-Suspended (Paddle) Fans

422.19 Space for Conductors

422.20 Outlet Boxes to Be Covered

422.21 Covering of Combustible Material at Outlet Boxes

422.22 Other Installation Methods

Part III. Disconnecting Means

422.30 General

422.31 Disconnection of Permanently Connected Appliances

(A) Rated at Not over 300 Volt-Amperes or 1/8 Horsepower

(B) Appliances Rated over 300 Volt-Amperes

(C) Motor-Operated Appliances Rated over 1/8 Horsepower

422.33 Disconnection of Cord-and-Plug-Connected or Attachment Fitting–Connected Appliances

(A) Separable Connector or an Attachment Plug (or Attachment Fitting) and Receptacle

(B) Connection at the Rear Base of a Range

(C) Rating

422.34 Unit Switch(es) as Disconnecting Means

(A) Multifamily Dwellings

(B) Two-Family Dwellings

(C) One-Family Dwellings

(D) Other Occupancies

422.35 Switch and Circuit Breaker to Be Indicating

Part IV. Construction

422.40 Polarity in Cord-and Plug-Connected Appliances

422.41 Cord-and Plug-Connected Appliances Subject to Immersion

422.42 Signals for Heated Appliances

422.43 Flexible Cords

(A) Heater Cords

(B) Other Heating Appliances

422.44 Cord-and Plug-Connected Immersion Heaters

422.45 Stands for Cord-and Plug-Connected Appliances

422.46 Flatirons

422.47 Water Heater Controls

422.48 Infrared Lamp Industrial Heating Appliances

(A) 300 Watts or Less
2017 NEC TABLE OF CONTENTS

(B) Over 300 Watts

422.50 Cord-and-Plug-Connected Pipe Heating Assemblies

Part V. Marking

422.60 Nameplate

(A) Nameplate Marking

(B) To Be Visible

422.61 Marking of Heating Elements

422.62 Appliances Consisting of Motors and Other Loads

(A) Nameplate Horsepower Markings

(B) Additional Nameplate Markings

Article 424 Fixed Electric Space-Heating Equipment

Part I. General

424.1 Scope

424.2 Other Articles

424.3 Branch Circuits

(A) Branch-Circuit Requirements

(B) Branch-Circuit Sizing

424.6 Listed Equipment

Part II. Installation

424.9 General

424.10 Special Permission

424.11 Supply Conductors

424.12 Locations

(A) Exposed to Physical Damage

(B) Damp or Wet Locations

424.13 Spacing from Combustible Materials

Part III. Control and Protection of Fixed Electric Space-Heating Equipment

424.19 Disconnecting Means

(A) Heating Equipment with Supplementary Overcurrent Protection

(B) Heating Equipment Without Supplementary Overcurrent Protection

424.20 Thermostatically Controlled Switching Devices

(A) Serving as Both Controllers andDisconnecting Means

(B) Thermostats That Do Not Directly Interrupt All Ungrounded Conductors

424.21 Switch and Circuit Breaker to Be Indicating

424.22 Overcurrent Protection

(A) Branch-Circuit Devices

(B) Resistance Elements

(C) Overcurrent Protective Devices

(D) Branch-Circuit Conductors

(E) Conductors for Subdivided Loads

Part IV. Marking of Heating Equipment

424.28 Nameplate

(A) Marking Required

(B) Location

424.29 Marking of Heating Elements

Part V. Electric Space-Heating Cables

424.34 Heating Cable Construction

424.35 Marking of Heating Cables

424.36 Clearances of Wiring in Ceilings

424.38 Area Restrictions

(A) Extending Beyond the Room or Area

(B) Uses Not Permitted

(C) In Closet Ceilings as Low-Temperature Heat Sources to Control Relative Humidity

424.39 Clearance from Other Objects and Openings

424.40 Splices

424.41 Ceiling Installation of Heating Cables on Dry Board, in Plaster, and on Concrete

(A) In Walls

(B) Adjacent Runs

(C) Surfaces to Be Applied
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>2017 NEC Table of Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>(D)</td>
<td>Splices</td>
<td>424.61 Installation of Duct Heaters with Heat Pumps and Air Conditioners</td>
</tr>
<tr>
<td>(E)</td>
<td>Ceiling Surface</td>
<td>424.62 Condensation</td>
</tr>
<tr>
<td>(F)</td>
<td>Secured</td>
<td>424.63 Fan Circuit Interlock</td>
</tr>
<tr>
<td>(G)</td>
<td>Dry Board Installations</td>
<td>424.64 Limit Controls</td>
</tr>
<tr>
<td>(H)</td>
<td>Free from Contact with Conductive Surfaces</td>
<td>424.65 Location of Disconnecting Means</td>
</tr>
<tr>
<td>(I)</td>
<td>Joists</td>
<td>424.66 Installation</td>
</tr>
<tr>
<td>(J)</td>
<td>Crossing Joists</td>
<td>Part VII. Resistance-Type Boilers</td>
</tr>
<tr>
<td>424.42</td>
<td>Finished Ceilings</td>
<td>424.70 Scope</td>
</tr>
<tr>
<td>424.43</td>
<td>Installation of Nonheating Leads of Cables</td>
<td>424.71 Identification</td>
</tr>
<tr>
<td>(A)</td>
<td>Free Nonheating Leads</td>
<td>424.72 Overcurrent Protection</td>
</tr>
<tr>
<td>(B)</td>
<td>Leads in Junction Box</td>
<td>(A) Boiler Employing Resistance-Type Immersion Heating Elements in an ASME Rated and Stamped Vessel</td>
</tr>
<tr>
<td>(C)</td>
<td>Excess Leads</td>
<td>(B) Boiler Employing Resistance-Type Heating Elements Rated More Than 48 Amperes and Not Contained in an ASME-Rated and Stamped Vessel</td>
</tr>
<tr>
<td>424.44</td>
<td>Installation of Cables in Concrete or Poured Masonry Floors</td>
<td>(C) Supplementary Overcurrent Protective Devices</td>
</tr>
<tr>
<td>(A)</td>
<td>Adjacent Runs</td>
<td>(D) Conductors Supplying Supplementary Overcurrent Protective Devices</td>
</tr>
<tr>
<td>(B)</td>
<td>Secured in Place</td>
<td>(E) Conductors for Subdivided Loads</td>
</tr>
<tr>
<td>(C)</td>
<td>Leads Protected</td>
<td>424.73 Overtemperature Limit Control</td>
</tr>
<tr>
<td>(D)</td>
<td>Bushings or Approved Fittings</td>
<td>424.74 Overpressure Limit Control</td>
</tr>
<tr>
<td>(E)</td>
<td>Ground-Fault Circuit-Interrupter Protection</td>
<td>Part VIII. Electrode-Type Boilers</td>
</tr>
<tr>
<td>424.45</td>
<td>Installation of Cables Under Floor Coverings</td>
<td>424.80 Scope</td>
</tr>
<tr>
<td>(A)</td>
<td>Identification</td>
<td>424.81 Identification</td>
</tr>
<tr>
<td>(B)</td>
<td>Expansion Joints</td>
<td>424.82 Branch-Circuit Requirements</td>
</tr>
<tr>
<td>(C)</td>
<td>Connection to Conductors</td>
<td>424.83 Overtemperature Limit Control</td>
</tr>
<tr>
<td>(D)</td>
<td>Anchoring</td>
<td>424.84 Overpressure Limit Control</td>
</tr>
<tr>
<td>(E)</td>
<td>Ground-Fault Circuit-Interrupter Protection</td>
<td>Part IX. Electric Radiant Heating Panels and Heating</td>
</tr>
<tr>
<td>(F)</td>
<td>Grounding Braid or Sheath</td>
<td>424.85 Grounding</td>
</tr>
<tr>
<td>424.46</td>
<td>Inspection and Tests</td>
<td>424.86 Markings</td>
</tr>
<tr>
<td>424.47</td>
<td>Label Provided by Manufacturer</td>
<td></td>
</tr>
<tr>
<td>Part VI. Duct Heaters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>424.57</td>
<td>General</td>
<td></td>
</tr>
<tr>
<td>424.58</td>
<td>Identification</td>
<td></td>
</tr>
<tr>
<td>424.59</td>
<td>Airflow</td>
<td></td>
</tr>
<tr>
<td>424.60</td>
<td>Elevated Inlet Temperature</td>
<td></td>
</tr>
</tbody>
</table>
### Panel Sets

424.90 Scope

424.91 Definitions

424.92 Markings
  
(A) Location

(B) Identified as Suitable

(C) Required Markings

424.93 Installation
  
(A) General

(B) Heating Panel Sets

424.94 Clearances of Wiring in Ceilings

424.95 Location of Branch-Circuit and Feeder Wiring in Walls
  
(A) Exterior Walls

(B) Interior Walls

424.96 Connection to Branch-Circuit Conductors
  
(A) General

(B) Heating Panels

(C) Heating Panel Sets

424.97 Nonheating Leads

424.98 Installation in Concrete or Poured Masonry
  
(A) Secured in Place and Identified as Suitable

(B) Expansion Joints

(C) Spacings

(D) Protection of Leads

(E) Bushings or Fittings Required

424.99 Installation Under Floor Covering
  
(A) Identification

(B) Installation

### Article 425 Fixed Resistance and Electrode

**Industrial Process Heating Equipment**

Part I. General

425.1 Scope

425.2 Other Articles

425.3 Branch Circuits

(A) Branch-Circuit Requirements

(B) Branch-Circuit Sizing

425.6 Listed Equipment

Part II. Installation

425.8 General

(A) Location

(B) Working Space

(C) Above Grade Level, Floor, or Work Platform

425.9 Approval

425.10 Special Permission

425.11 Supply Conductors

425.12 Locations

425.13 Spacing from Combustible Materials

425.14 Infrared Lamp Industrial Heating Equipment

Part III. Control and Protection of Fixed Industrial Process Heating Equipment

425.19 Disconnecting Means
2017 NEC TABLE OF CONTENTS

(A) Heating Equipment with Supplementary Overcurrent Protection
(B) Heating Equipment Without Supplementary Overcurrent Protection
(C) Unit Switch(es) as Disconnecting Means
425.21 Switch and Circuit Breaker to Be Indicating
425.22 (A) Branch-Circuit Devices
(B) Resistance Elements
(C) Overcurrent Protective Devices
(D) Branch-Circuit Conductors
(E) Conductors for Subdivided Loads
Part IV. Marking of Heating Equipment
425.28 Nameplate
(A) Marking Required
(B) Location
425.29 Marking of Heating Elements
425.45 Concealed Fixed Industrial Heating Equipment — Inspection and Tests
Part V. Fixed Industrial Process Duct Heaters
425.57 General
425.58 Identification
425.59 Airflow
425.60 Elevated Inlet Temperature
425.63 Fan Circuit Interlock
425.64 Limit Controls
425.65 Location of Disconnecting Means
Part VI. Fixed Industrial Process Resistance-Type Boilers
425.70 Scope
425.71 Identification
425.72 Overcurrent Protection
(A) Boiler Employing Resistance-Type Heating Elements Rated More Than 48 Amperes and Not Contained in an ASME-Rated and Stamped Vessel
(C) Supplementary Overcurrent Protective Devices
(D) Suitable for Branch-Circuit Protection
(E) Conductors Supplying Supplementary Overcurrent Protective Devices
(F) Conductors for Subdivided Loads
425.73 Overtemperature Limit Control
425.74 Overpressure Limit Control
Part VII. Fixed Industrial Process Electrode-Type Boilers
425.80 Scope
425.81 Identification
425.82 Branch-Circuit Requirements
425.83 Overtemperature Limit Control
425.84 Overpressure Limit Control
425.85 Grounding
425.86 Markings

Article 426 Fixed Outdoor Electric Deicing and Snow-Melting Equipment
Part I. General
426.1 Scope
(A) Embedded
(B) Exposed
426.2 Definitions
426.3 Application of Other Articles
426.4 Continuous Load
Part II. Installation
426.10 General
426.11 Use
426.12 Thermal Protection
426.13 Identification
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>426.14</td>
<td>Special Permission</td>
</tr>
<tr>
<td><strong>Part III. Resistance Heating Elements</strong></td>
<td></td>
</tr>
<tr>
<td>426.20</td>
<td>Embedded Deicing and Snow-Melting Equipment</td>
</tr>
<tr>
<td>(A)</td>
<td>Watt Density</td>
</tr>
<tr>
<td>(B)</td>
<td>Spacing</td>
</tr>
<tr>
<td>(C)</td>
<td>Cover</td>
</tr>
<tr>
<td>(D)</td>
<td>Secured</td>
</tr>
<tr>
<td>(E)</td>
<td>Expansion and Contraction</td>
</tr>
<tr>
<td>426.21</td>
<td>Exposed Deicing and Snow-Melting Equipment</td>
</tr>
<tr>
<td>(A)</td>
<td>Secured</td>
</tr>
<tr>
<td>(B)</td>
<td>Overtemperature</td>
</tr>
<tr>
<td>(C)</td>
<td>Expansion and Contraction</td>
</tr>
<tr>
<td>(D)</td>
<td>Flexural Capability</td>
</tr>
<tr>
<td>426.22</td>
<td>Installation of Nonheating Leads for Embedded Equipment</td>
</tr>
<tr>
<td>(A)</td>
<td>Grounding Sheath or Braid</td>
</tr>
<tr>
<td>(B)</td>
<td>Raceways</td>
</tr>
<tr>
<td>(C)</td>
<td>Bushings</td>
</tr>
<tr>
<td>(D)</td>
<td>Expansion and Contraction</td>
</tr>
<tr>
<td>(E)</td>
<td>Leads in Junction Boxes</td>
</tr>
<tr>
<td>426.23</td>
<td>Installation of Nonheating Leads for Exposed Equipment</td>
</tr>
<tr>
<td>(A)</td>
<td>Nonheating Leads</td>
</tr>
<tr>
<td>(B)</td>
<td>Protection</td>
</tr>
<tr>
<td>426.24</td>
<td>Electrical Connection</td>
</tr>
<tr>
<td>(A)</td>
<td>Heating Element Connections</td>
</tr>
<tr>
<td>(B)</td>
<td>Circuit Connections</td>
</tr>
<tr>
<td>426.25</td>
<td>Marking</td>
</tr>
<tr>
<td>426.26</td>
<td>Corrosion Protection</td>
</tr>
<tr>
<td>426.27</td>
<td>Grounding Braid or Sheath</td>
</tr>
<tr>
<td>426.28</td>
<td>Ground-Fault Protection of Equipment</td>
</tr>
<tr>
<td><strong>Part IV. Impedance Heating</strong></td>
<td></td>
</tr>
<tr>
<td>426.30</td>
<td>Personnel Protection</td>
</tr>
<tr>
<td><strong>Part V. Skin-Effect Heating</strong></td>
<td></td>
</tr>
<tr>
<td>426.31</td>
<td>Isolation Transformer</td>
</tr>
<tr>
<td>426.32</td>
<td>Voltage Limitations</td>
</tr>
<tr>
<td>426.33</td>
<td>Induced Currents</td>
</tr>
<tr>
<td>426.34</td>
<td>Grounding</td>
</tr>
<tr>
<td>426.40</td>
<td>Conductor Ampacity</td>
</tr>
<tr>
<td>426.41</td>
<td>Pull Boxes</td>
</tr>
<tr>
<td>426.42</td>
<td>Single Conductor in Enclosure</td>
</tr>
<tr>
<td>426.43</td>
<td>Corrosion Protection</td>
</tr>
<tr>
<td>426.44</td>
<td>Grounding</td>
</tr>
<tr>
<td><strong>Part VI. Control and Protection</strong></td>
<td></td>
</tr>
<tr>
<td>426.50</td>
<td>Disconnecting Means</td>
</tr>
<tr>
<td>(A)</td>
<td>Disconnection</td>
</tr>
<tr>
<td>(B)</td>
<td>Cord-and-Plug-Connected Equipment</td>
</tr>
<tr>
<td>426.51</td>
<td>Controllers</td>
</tr>
<tr>
<td>(A)</td>
<td>Temperature Controller with “Off” Position</td>
</tr>
<tr>
<td>(B)</td>
<td>Temperature Controller Without “Off” Position</td>
</tr>
<tr>
<td>(C)</td>
<td>Remote Temperature Controller</td>
</tr>
<tr>
<td>(D)</td>
<td>Combined Switching Devices</td>
</tr>
<tr>
<td>426.54</td>
<td>Cord-and-Plug-Connected Deicing and Snow-Melting Equipment</td>
</tr>
</tbody>
</table>

**Article 427 Fixed Electric Heating Equipment for Pipelines and Vessels**

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Part I. General</strong></td>
<td></td>
</tr>
<tr>
<td>427.1</td>
<td>Scope</td>
</tr>
<tr>
<td>427.2</td>
<td>Definitions</td>
</tr>
<tr>
<td>427.3</td>
<td>Application of Other Articles</td>
</tr>
<tr>
<td>427.4</td>
<td>Continuous Load</td>
</tr>
<tr>
<td><strong>Part II. Installation</strong></td>
<td></td>
</tr>
<tr>
<td>427.10</td>
<td>General</td>
</tr>
<tr>
<td>427.11</td>
<td>Use</td>
</tr>
</tbody>
</table>
## 2017 NEC Table of Contents

### Part III. Resistance Heating Elements

<table>
<thead>
<tr>
<th>Article</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>427.12</td>
<td>Thermal Protection</td>
</tr>
<tr>
<td>427.13</td>
<td>Identification</td>
</tr>
<tr>
<td>427.14</td>
<td>Secured</td>
</tr>
<tr>
<td>427.15</td>
<td>Not in Direct Contact</td>
</tr>
<tr>
<td>427.16</td>
<td>Expansion and Contraction</td>
</tr>
<tr>
<td>427.17</td>
<td>Flexural Capability</td>
</tr>
<tr>
<td>427.18</td>
<td>Power Supply Leads</td>
</tr>
<tr>
<td>(A)</td>
<td>Nonheating Leads</td>
</tr>
<tr>
<td>(B)</td>
<td>Power Supply Leads Protection</td>
</tr>
<tr>
<td>(C)</td>
<td>Interconnecting Leads</td>
</tr>
<tr>
<td>427.19</td>
<td>Electrical Connections</td>
</tr>
<tr>
<td>(A)</td>
<td>Nonheating Interconnections</td>
</tr>
<tr>
<td>(B)</td>
<td>Circuit Connections</td>
</tr>
<tr>
<td>427.20</td>
<td>Marking</td>
</tr>
<tr>
<td>427.22</td>
<td>Ground-Fault Protection of Equipment</td>
</tr>
<tr>
<td>427.23</td>
<td>Grounded Conductive Covering</td>
</tr>
<tr>
<td>(A)</td>
<td>Heating Wires or Cables</td>
</tr>
<tr>
<td>(B)</td>
<td>Heating Panels</td>
</tr>
</tbody>
</table>

### Part IV. Impedance Heating

<table>
<thead>
<tr>
<th>Article</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>427.25</td>
<td>Personnel Protection</td>
</tr>
<tr>
<td>427.26</td>
<td>Isolation Transformer</td>
</tr>
<tr>
<td>427.27</td>
<td>Voltage Limitations</td>
</tr>
<tr>
<td>427.28</td>
<td>Induced Currents</td>
</tr>
<tr>
<td>427.29</td>
<td>Grounding</td>
</tr>
<tr>
<td>427.30</td>
<td>Secondary Conductor Sizing</td>
</tr>
</tbody>
</table>

### Part V. Induction Heating

<table>
<thead>
<tr>
<th>Article</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>427.35</td>
<td>Scope</td>
</tr>
<tr>
<td>427.36</td>
<td>Personnel Protection</td>
</tr>
<tr>
<td>427.37</td>
<td>Induced Current</td>
</tr>
</tbody>
</table>

### Part VI. Skin-Effect Heating

<table>
<thead>
<tr>
<th>Article</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>427.45</td>
<td>Conductor Ampacity</td>
</tr>
<tr>
<td>427.46</td>
<td>Pull Boxes</td>
</tr>
</tbody>
</table>

### Part VII. Control and Protection

<table>
<thead>
<tr>
<th>Article</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>427.47</td>
<td>Single Conductor in Enclosure</td>
</tr>
<tr>
<td>427.48</td>
<td>Grounding</td>
</tr>
<tr>
<td>427.55</td>
<td>Disconnecting Means</td>
</tr>
<tr>
<td>(A)</td>
<td>Switch or Circuit Breaker</td>
</tr>
<tr>
<td>(B)</td>
<td>Cord-and-Plug-Connected Equipment</td>
</tr>
<tr>
<td>427.56</td>
<td>Controls</td>
</tr>
<tr>
<td>(A)</td>
<td>Temperature Control with “Off” Position</td>
</tr>
<tr>
<td>(B)</td>
<td>Temperature Control Without “Off” Position</td>
</tr>
<tr>
<td>(C)</td>
<td>Remote Temperature Controller</td>
</tr>
<tr>
<td>(D)</td>
<td>Combined Switching Devices</td>
</tr>
<tr>
<td>427.57</td>
<td>Overcurrent Protection</td>
</tr>
</tbody>
</table>

### Article 430 Motors, Motor Circuits, and Controllers

#### Part I. General

<table>
<thead>
<tr>
<th>Article</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>430.1</td>
<td>Scope</td>
</tr>
<tr>
<td>430.2</td>
<td>Definitions</td>
</tr>
<tr>
<td>430.4</td>
<td>Part-Winding Motors</td>
</tr>
<tr>
<td>430.5</td>
<td>Other Articles</td>
</tr>
<tr>
<td>430.6</td>
<td>Ampacity and Motor Rating Determination</td>
</tr>
<tr>
<td>(A)</td>
<td>General Motor Applications</td>
</tr>
<tr>
<td>(B)</td>
<td>Torque Motors</td>
</tr>
<tr>
<td>(C)</td>
<td>Alternating-Current Adjustable Voltage Motors</td>
</tr>
<tr>
<td>(D)</td>
<td>Valve Actuator Motor Assemblies</td>
</tr>
<tr>
<td>430.7</td>
<td>Marking on Motors and Multimotor Equipment</td>
</tr>
<tr>
<td>(A)</td>
<td>Usual Motor Applications</td>
</tr>
<tr>
<td>(B)</td>
<td>Locked-Rotor Indicating Code Letters</td>
</tr>
<tr>
<td>(C)</td>
<td>Torque Motors</td>
</tr>
<tr>
<td>(D)</td>
<td>Multimotor and Combination-Load Equipment</td>
</tr>
<tr>
<td>430.8</td>
<td>Marking on Controllers</td>
</tr>
<tr>
<td>430.9</td>
<td>Terminals</td>
</tr>
<tr>
<td>(A)</td>
<td>Markings</td>
</tr>
<tr>
<td>(B)</td>
<td>Conductors</td>
</tr>
<tr>
<td>Section</td>
<td>430.25 Multimotor and Combination-Load Equipment</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>(C) Torque Requirements</td>
<td></td>
</tr>
<tr>
<td>430.10 Wiring Space in Enclosures</td>
<td></td>
</tr>
<tr>
<td>(A) General</td>
<td></td>
</tr>
<tr>
<td>(B) Wire-Bending Space in Enclosures</td>
<td></td>
</tr>
<tr>
<td>430.11 Protection Against Liquids</td>
<td></td>
</tr>
<tr>
<td>430.12 Motor Terminal Housings</td>
<td></td>
</tr>
<tr>
<td>(A) Material</td>
<td></td>
</tr>
<tr>
<td>(B) Dimensions and Space — Wire-to-Wire Connections</td>
<td></td>
</tr>
<tr>
<td>(C) Dimensions and Space — Fixed Terminal Connections</td>
<td></td>
</tr>
<tr>
<td>(D) Large Wire or Factory Connections</td>
<td></td>
</tr>
<tr>
<td>(E) Equipment Grounding Connections</td>
<td></td>
</tr>
<tr>
<td>430.13 Bushing</td>
<td></td>
</tr>
<tr>
<td>430.14 Location of Motors</td>
<td></td>
</tr>
<tr>
<td>(A) Ventilation and Maintenance</td>
<td></td>
</tr>
<tr>
<td>(B) Open Motors</td>
<td></td>
</tr>
<tr>
<td>430.16 Exposure to Dust Accumulations</td>
<td></td>
</tr>
<tr>
<td>430.17 Highest Rated or Smallest Rated Motor</td>
<td></td>
</tr>
<tr>
<td>430.18 Nominal Voltage of Rectifier Systems</td>
<td></td>
</tr>
<tr>
<td>Part II. Motor Circuit Conductors</td>
<td></td>
</tr>
<tr>
<td>430.21 General</td>
<td></td>
</tr>
<tr>
<td>430.22 Single Motor</td>
<td></td>
</tr>
<tr>
<td>(A) Direct-Current Motor-Rectifier Supplied</td>
<td></td>
</tr>
<tr>
<td>(B) Multispeed Motor</td>
<td></td>
</tr>
<tr>
<td>(C) Wye-Start, Delta-Run Motor</td>
<td></td>
</tr>
<tr>
<td>(D) Part-Winding Motor</td>
<td></td>
</tr>
<tr>
<td>(E) Other Than Continuous Duty</td>
<td></td>
</tr>
<tr>
<td>(F) Separate Terminal Enclosure</td>
<td></td>
</tr>
<tr>
<td>(G) Conductors for Small Motors</td>
<td></td>
</tr>
<tr>
<td>430.23 Wound-Rotor Secondary</td>
<td></td>
</tr>
<tr>
<td>(A) Continuous Duty</td>
<td></td>
</tr>
<tr>
<td>(B) Other Than Continuous Duty</td>
<td></td>
</tr>
<tr>
<td>(C) Resistor Separate from Controller</td>
<td></td>
</tr>
<tr>
<td>430.24 Several Motors or a Motor(s) and Other Load(s)</td>
<td></td>
</tr>
<tr>
<td>Part III. Motor and Branch-Circuit Overload</td>
<td></td>
</tr>
<tr>
<td>Protection</td>
<td></td>
</tr>
<tr>
<td>430.31 General</td>
<td></td>
</tr>
<tr>
<td>430.32 Continuous-Duty Motors</td>
<td></td>
</tr>
<tr>
<td>(A) More Than 1 Horsepower</td>
<td></td>
</tr>
<tr>
<td>(B) One Horsepower or Less, Automatically Started</td>
<td></td>
</tr>
<tr>
<td>(C) Selection of Overload Device</td>
<td></td>
</tr>
<tr>
<td>(D) One Horsepower or Less, Nonautomatically Started</td>
<td></td>
</tr>
<tr>
<td>(E) Wound-Rotor Secondaries</td>
<td></td>
</tr>
<tr>
<td>430.33 Intermittent and Similar Duty</td>
<td></td>
</tr>
<tr>
<td>430.35 Shunting During Starting Period</td>
<td></td>
</tr>
<tr>
<td>(A) Nonautomatically Started</td>
<td></td>
</tr>
<tr>
<td>(B) Automatically Started</td>
<td></td>
</tr>
<tr>
<td>430.36 Fuses — In Which Conductor</td>
<td></td>
</tr>
<tr>
<td>430.37 Devices Other Than Fuses — In Which Conductor</td>
<td></td>
</tr>
<tr>
<td>430.38 Number of Conductors Opened by Overload Device</td>
<td></td>
</tr>
<tr>
<td>430.39 Motor Controller as Overload Protection</td>
<td></td>
</tr>
<tr>
<td>430.40 Overload Relays</td>
<td></td>
</tr>
<tr>
<td>430.42 Motors on General-Purpose Branch Circuits</td>
<td></td>
</tr>
<tr>
<td>(A) Not over 1 Horsepower</td>
<td></td>
</tr>
<tr>
<td>(B) Over 1 Horsepower</td>
<td></td>
</tr>
<tr>
<td>(C) Cord-and Plug-Connected</td>
<td></td>
</tr>
<tr>
<td>(D) Time Delay</td>
<td></td>
</tr>
<tr>
<td>430.43 Automatic Restarting</td>
<td></td>
</tr>
<tr>
<td>430.44 Orderly Shutdown</td>
<td></td>
</tr>
<tr>
<td>Part IV. Motor Branch-Circuit Short-Circuit and Ground-Fault Protection</td>
<td></td>
</tr>
</tbody>
</table>
430.51 General

430.52 Rating or Setting for Individual Motor Circuit
(A) General

(B) All Motors

(C) Rating or Setting

(D) Torque Motors

430.53 Several Motors or Loads on One Branch Circuit
(A) Not Over 1 Horsepower
(B) If Smallest Rated Motor Protected
(C) Other Group Installations
(D) Single Motor Taps

430.54 Multimotor and Combination-Load Equipment
430.55 Combined Overcurrent Protection

430.56 Branch-Circuit Protective Devices — In Which Conductor

430.57 Size of Fuseholder

430.58 Rating of Circuit Breaker

Part V. Motor Feeder Short-Circuit and Ground-Fault Protection

430.61 General

430.62 Rating or Setting — Motor Load
(A) Specific Load

(B) Other Installations

430.63 Rating or Setting — Motor Load and Other Load(s)

Part VI. Motor Control Circuits

430.71 General

430.72 Overcurrent Protection
(A) General

(B) Conductor Protection

(C) Control Circuit Transformer

430.73 Protection of Conductors from Physical Damage

430.74 Electrical Arrangement of Control Circuits

430.75 Disconnection

Part VII. Motor Controllers

430.81 General

(A) Stationary Motor of 1/8 Horsepower or Less

(B) Portable Motor of 1/3 Horsepower or Less

430.82 Controller Design
(A) Starting and Stopping

(B) Autotransformer

(C) Rheostats

430.83 Ratings

Part VIII. Motor Control Centers

430.92 General

430.94 Overcurrent Protection

430.95 Service Equipment

430.96 Grounding

430.97 Busbars and Conductors
(A) Support and Arrangement

(B) Phase Arrangement

(C) Minimum Wire-Bending Space

(D) Spacings

(E) Barriers
430.98 Marking
(A) Motor Control Centers
(B) Motor Control Units

430.99 Available Fault Current

Part IX. Disconnecting Means

430.101 General
430.102 Location
(A) Controller
(B) Motor
430.103 Operation
430.104 To Be Indicating
430.105 Grounded Conductors
430.107 Readily Accessible
430.108 Every Disconnecting Means
430.109 Type
(A) General
(B) Stationary Motors of 1/8 Horsepower or Less
(C) Stationary Motors of 2 Horsepower or Less
(D) Autotransformer-Type Controlled Motors
(E) Isolating Switches
(F) Cord-and-Plug-Connected Motors
(G) Torque Motors
430.110 Ampere Rating and Interrupting Capacity
(A) General
(B) For Torque Motors
(C) For Combination Loads
430.111 Switch or Circuit Breaker as Both Controller and Disconnecting Means
(A) General
(B) Type
430.112 Motors Served by Single Disconnecting Means
430.113 Energy from More Than One Source

Part X. Adjustable-Speed Drive Systems

430.120 General
430.122 Conductors — Minimum Size and Ampacity
(A) Branch/Feeder Circuit Conductors
(B) Bypass Device

430.124 Overload Protection
(A) Included in Power Conversion Equipment
(B) Bypass Circuits
(C) Multiple Motor Applications

430.126 Motor Overtemperature Protection
(A) General
(B) Multiple Motor Applications
(C) Automatic Restarting and Orderly Shutdown

430.128 Disconnecting Means
430.130 Branch-Circuit Short-Circuit and Ground-Fault Protection for Single Motor Circuits Containing Power Conversion Equipment

430.131 Several Motors or Loads on One Branch Circuit Including Power Conversion Equipment

Part XI. Over 1000 Volts, Nominal

430.220 General
430.222 Marking on Controllers
430.223 Raceway Connection to Motors
430.224 Size of Conductors
430.225 Motor-Circuit Overcurrent Protection
(A) General
(B) Overload Protection
(C) Fault-Current Protection

430.226 Rating of Motor Control Apparatus
430.227 Disconnecting Means

Part XII. Protection of Live Parts — All Voltages

430.231 General
2017 NEC TABLE OF CONTENTS

430.232 Where Required
430.233 Guards for Attendants

Part XIII. Grounding — All Voltages
430.241 General
430.242 Stationary Motors
430.243 Portable Motors
430.244 Controllers
430.245 Method of Grounding
(A) Grounding Through Terminal Housings
(B) Separation of Junction Box from Motor
(C) Grounding of Controller-Mounted Devices

Part XIV. Tables

Article 440 Air-Conditioning and Refrigerating Equipment
Part I. General
440.1 Scope
440.2 Definitions
440.3 Other Articles
(A) Article 430
(B) Articles 422, 424, or 430
(C) Article 422
(D) Other Applicable Articles
440.4 Marking on Hermetic Refrigerant Motor-Compressors and Equipment
(A) Hermetic Refrigerant Motor-Compressor Nameplate
(B) Multimotor and Combination-Load Equipment
(C) Branch-Circuit Selection Current
440.5 Marking on Controllers
440.6 Ampacity and Rating
(A) Hermetic Refrigerant Motor-Compressor
(B) Multimotor Equipment
440.7 Highest Rated (Largest) Motor
440.8 Single Machine
440.9 Grounding and Bonding
440.10 Short-Circuit Current Rating

(A) Installation
(B) Documentation
Part II. Disconnecting Means
440.11 General
440.12 Rating and Interrupting Capacity
(A) Hermetic Refrigerant Motor-Compressor
(B) Combination Loads
(C) Small Motor-Compressors
(D) Disconnecting Means
(E) Disconnecting Means Rated in Excess of 100 Horsepower

Part III. Branch-Circuit Short-Circuit and Ground-Fault Protection
440.13 Cord-Connected Equipment
440.14 Location
Part III. Branch-Circuit Short-Circuit and Ground-Fault Protection
440.21 General
440.22 Application and Selection
(A) Rating or Setting for Individual Motor-Compressor
(B) Rating or Setting for Equipment
(C) Protective Device Rating Not to Exceed the Manufacturer’s Values

Part IV. Branch-Circuit Conductors
440.31 General
440.32 Single Motor-Compressor
440.33 Motor-Compressor(s) With or Without Additional Motor Loads
440.34 Combination Load
440.35 Multimotor and Combination-Load Equipment

Part V. Controllers for Motor-Compressors
440.41 Rating
(A) Motor-Compressor Controller
(B) Controller Serving More Than One Load
<p>| Section | Title | 440.51 General | 440.52 Application and Selection | (A) Protection of Motor-Compressor | (B) Protection of Motor-Compressor Control | Apparatus and Branch-Circuit Conductors | 440.53 Overload Relays | 440.54 Motor-Compressors and Equipment on 15- or 20-Ampere Branch Circuits — Not Cord- and Attachment-Plug-Connected | (A) Overload Protection | (B) Time Delay | 440.55 Cord- and Attachment-Plug-Connected Motor-Compressors and Equipment on 15- or 20-Ampere Branch Circuits | (A) Overload Protection | (B) Attachment Plug and Receptacle or Cord Connector Rating | (C) Time Delay | 440.60 General | 440.61 Grounding | 440.62 Branch-Circuit Requirements | (A) Room Air Conditioner as a Single Motor Unit | (B) Where No Other Loads Are Supplied | (C) Where Lighting Units or Other Appliances Are Also Supplied | 440.63 Disconnecting Means | 440.64 Supply Cords | 440.65 Protection Devices | 445.1 Scope | 445.10 Location | 445.11 Marking | 445.12 Overcurrent Protection | (A) Constant-Voltage Generators | (B) Two-Wire Generators | (C) 65 Volts or Less | (D) Balancer Sets | (E) Three-Wire, Direct-Current Generators | 445.13 Ampacity of Conductors | (A) General | (B) Overcurrent Protection Provided | 445.14 Protection of Live Parts | 445.15 Guards for Attendants | 445.16 Bushings | 445.17 Generator Terminal Housings | 445.18 Disconnecting Means and Shutdown of Prime Mover | (A) Disconnecting Means | (B) Shutdown of Prime Mover | (C) Generators Installed in Parallel | 445.20 Ground-Fault Circuit-Interrupter Protection for Receptacles on 15-kW or Smaller Portable Generators | (A) Unbonded (Floating Neutral) Generators | (B) Bonded Neutral Generators | Article 450 Transformers and Transformer Vaults (Including Secondary Ties) | Part I. General Provisions | 450.1 Scope | 450.2 Definition | 450.3 Overcurrent Protection | (A) Transformers Over 1000 Volts, Nominal | (B) Transformers 1000 Volts, Nominal, or Less |</p>
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Part I. General</strong></td>
<td></td>
</tr>
<tr>
<td>450.1</td>
<td>Types of Transformers</td>
</tr>
<tr>
<td>450.21</td>
<td>Dry-Type Transformers Installed Indoors</td>
</tr>
<tr>
<td>450.22</td>
<td>Dry-Type Transformers Installed Outdoors</td>
</tr>
<tr>
<td>450.23</td>
<td>Less-Flammable Liquid-Insulated Transformers</td>
</tr>
<tr>
<td>450.24</td>
<td>Nonflammable Fluid-Insulated Transformers</td>
</tr>
<tr>
<td>450.25</td>
<td>Askarel-Insulated Transformers Installed Indoors</td>
</tr>
<tr>
<td>450.26</td>
<td>Oil-Insulated Transformers Installed Indoors</td>
</tr>
<tr>
<td>450.27</td>
<td>Oil-Insulated Transformers Installed Outdoors</td>
</tr>
<tr>
<td>450.28</td>
<td>Modification of Transformers</td>
</tr>
<tr>
<td><strong>Part II. Specific Provisions Applicable to Different Types of Transformers</strong></td>
<td></td>
</tr>
<tr>
<td>450.21</td>
<td>Dry-Type Transformers Installed Indoors</td>
</tr>
<tr>
<td>450.22</td>
<td>Dry-Type Transformers Installed Outdoors</td>
</tr>
<tr>
<td>450.23</td>
<td>Less-Flammable Liquid-Insulated Transformers</td>
</tr>
<tr>
<td>450.24</td>
<td>Nonflammable Fluid-Insulated Transformers</td>
</tr>
<tr>
<td>450.25</td>
<td>Askarel-Insulated Transformers Installed Indoors</td>
</tr>
<tr>
<td>450.26</td>
<td>Oil-Insulated Transformers Installed Indoors</td>
</tr>
<tr>
<td>450.27</td>
<td>Oil-Insulated Transformers Installed Outdoors</td>
</tr>
<tr>
<td>450.28</td>
<td>Modification of Transformers</td>
</tr>
<tr>
<td><strong>Part III. Transformer Vaults</strong></td>
<td></td>
</tr>
<tr>
<td>450.41</td>
<td>Location</td>
</tr>
<tr>
<td>450.42</td>
<td>Walls, Roofs, and Floors</td>
</tr>
<tr>
<td>450.43</td>
<td>Doorways</td>
</tr>
<tr>
<td><strong>Article 455 Phase Converters</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Part I. General</strong></td>
<td></td>
</tr>
<tr>
<td>450.47</td>
<td>Water Pipes and Accessories</td>
</tr>
<tr>
<td>450.48</td>
<td>Storage in Vaults</td>
</tr>
</tbody>
</table>
455.1 Scope
455.2 Definitions
455.3 Other Articles
455.4 Marking
455.5 Equipment Grounding Connection
455.6 Conductors
  (A) Ampacity
  (B) Manufactured Phase Marking
455.7 Overcurrent Protection
  (A) Variable Loads
  (B) Fixed Loads
455.8 Disconnecting Means
  (A) Location
  (B) Type
  (C) Rating
  (D) Voltage Ratios
455.9 Connection of Single-Phase Loads
455.10 Terminal Housings

Part II. Specific Provisions Applicable to Different Types of Phase Converters
455.20 Disconnecting Means
455.21 Start-Up
455.22 Power Interruption
455.23 Capacitors

Article 460 Capacitors
460.1 Scope
460.2 Enclosing and Guarding
  (A) Containing More Than 11 L (3 gal) of Flammable Liquid
  (B) Accidental Contact

Part I. 1000 Volts, Nominal, and Under
460.6 Discharge of Stored Energy
  (A) Time of Discharge

(B) Means of Discharge
460.8 Conductors
  (A) Ampacity
  (B) Overcurrent Protection
  (C) Disconnecting Means
460.9 Rating or Setting of Motor Overload Device
460.10 Grounding
460.12 Marking

Part II. Over 1000 Volts, Nominal
460.24 Switching
  (A) Load Current
  (B) Isolation
  (C) Additional Requirements for Series Capacitors
460.25 Overcurrent Protection
  (A) Provided to Detect and Interrupt Fault Current
  (B) Single Pole or Multipole Devices
  (C) Protected Individually or in Groups
  (D) Protective Devices Rated or Adjusted
460.26 Identification
460.27 Grounding
460.28 Means for Discharge
  (A) Means to Reduce the Residual Voltage
  (B) Connection to Terminals

Article 470 Resistors and Reactors
Part I. 1000 Volts, Nominal, and Under
470.1 Scope
470.2 Location
470.3 Space Separation
470.4 Conductor Insulation

Part II. Over 1000 Volts, Nominal
470.18 General
  (A) Protected Against Physical Damage
  (B) Isolated by Enclosure or Elevation
### Article 480 Storage Batteries

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>480.1</td>
<td>Scope</td>
</tr>
<tr>
<td>480.2</td>
<td>Definitions</td>
</tr>
<tr>
<td>480.3</td>
<td>Equipment</td>
</tr>
<tr>
<td>480.4</td>
<td>Battery and Cell Terminations</td>
</tr>
<tr>
<td>(A)</td>
<td>Corrosion Prevention</td>
</tr>
<tr>
<td>(B)</td>
<td>Intercell and Intertier Conductors and Connections</td>
</tr>
<tr>
<td>(C)</td>
<td>Battery Terminals</td>
</tr>
<tr>
<td>480.5</td>
<td>Wiring and Equipment Supplied from Batteries</td>
</tr>
<tr>
<td>480.6</td>
<td>Overcurrent Protection for Prime Movers</td>
</tr>
<tr>
<td>480.7</td>
<td>DC Disconnect Methods</td>
</tr>
<tr>
<td>(A)</td>
<td>Disconnecting Means</td>
</tr>
<tr>
<td>(B)</td>
<td>Remote Actuation</td>
</tr>
<tr>
<td>(C)</td>
<td>Busway</td>
</tr>
<tr>
<td>(D)</td>
<td>Notification</td>
</tr>
<tr>
<td>480.8</td>
<td>Insulation of Batteries</td>
</tr>
<tr>
<td>480.9</td>
<td>Battery Support Systems</td>
</tr>
<tr>
<td>480.10</td>
<td>Battery Locations</td>
</tr>
<tr>
<td>(A)</td>
<td>Ventilation</td>
</tr>
<tr>
<td>(B)</td>
<td>Live Parts</td>
</tr>
<tr>
<td>(C)</td>
<td>Spaces About Battery Systems</td>
</tr>
<tr>
<td>(D)</td>
<td>Top Terminal Batteries</td>
</tr>
<tr>
<td>(E)</td>
<td>Egress</td>
</tr>
<tr>
<td>(F)</td>
<td>Piping in Battery Rooms</td>
</tr>
<tr>
<td>(G)</td>
<td>Illumination</td>
</tr>
<tr>
<td>480.11</td>
<td>Vents</td>
</tr>
<tr>
<td>(A)</td>
<td>Vented Cells</td>
</tr>
</tbody>
</table>

### Article 490 Equipment Over 1000 Volts, Nominal

#### Part I. General

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>490.1</td>
<td>Scope</td>
</tr>
<tr>
<td>490.2</td>
<td>Definition</td>
</tr>
</tbody>
</table>

#### Part II. Equipment — Specific Provisions

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>490.21</td>
<td>Circuit-Interrupting Devices</td>
</tr>
<tr>
<td>(A)</td>
<td>Circuit Breakers</td>
</tr>
<tr>
<td>(B)</td>
<td>Power Fuses and Fuseholders</td>
</tr>
<tr>
<td>(C)</td>
<td>Distribution Cutouts and Fuse Links — Expulsion Type</td>
</tr>
<tr>
<td>(D)</td>
<td>Oil-Filled Cutouts</td>
</tr>
<tr>
<td>(E)</td>
<td>Load Interrupters</td>
</tr>
</tbody>
</table>

#### Part III. Equipment — Switchgear and Industrial Control Assemblies

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>490.30</td>
<td>General</td>
</tr>
<tr>
<td>490.31</td>
<td>Arrangement of Devices in Assemblies</td>
</tr>
<tr>
<td>490.32</td>
<td>Guarding of High-Voltage Energized Parts Within a Compartment</td>
</tr>
<tr>
<td>490.33</td>
<td>Guarding of Energized Parts Operating at 1000 Volts, Nominal, or Less Within Compartments</td>
</tr>
<tr>
<td>490.34</td>
<td>Clearance for Cable Conductors Entering Enclosure</td>
</tr>
<tr>
<td>490.35</td>
<td>Accessibility of Energized Parts</td>
</tr>
<tr>
<td>(A)</td>
<td>High-Voltage Equipment</td>
</tr>
<tr>
<td>(B)</td>
<td>Control Equipment</td>
</tr>
<tr>
<td>(C)</td>
<td>High-Voltage Instruments or Control Transformers and Space Heaters</td>
</tr>
</tbody>
</table>
490.36 Grounding
490.37 Grounding of Devices
490.38 Door Stops and Cover Plates
490.39 Gas Discharge from Interrupting Devices
490.40 Visual Inspection Windows
490.41 Location of Industrial Control Equipment

(A) Control and Instrument Transfer Switch Handles or Push Buttons
(B) Infrequently Operated Devices
490.42 Interlocks — Interrupter Switches
490.43 Stored Energy for Opening
490.44 Fused Interrupter Switches

(A) Supply Terminals
(B) Backfeed
(C) Switching Mechanism
490.45 Circuit Breakers — Interlocks

(A) Circuit Breakers
(B) Mechanical Interlocks
490.46 Circuit Breaker Locking
490.47 Switchgear Used as Service Equipment
490.48 Substation Design, Documentation, and Required Diagram

(A) Design and Documentation
(B) Diagram

Part IV. Mobile and Portable Equipment
490.51 General

(A) Covered
(B) Other Requirements
(C) Protection
(D) Disconnecting Means
490.52 Overcurrent Protection
490.53 Enclosures
490.54 Collector Rings

490.55 Power Cable Connections to Mobile Machines
490.56 High-Voltage Portable Cable for Main Power Supply

Part V. Electrode-Type Boilers
490.70 General
490.71 Electrical Supply System
490.72 Branch-Circuit Requirements

(A) Rating
(B) Common-Trip Fault-Interrupting Device
(C) Phase-Fault Protection
(D) Ground Current Detection
(E) Grounded Neutral Conductor
490.73 Pressure and Temperature Limit Control
490.74 Bonding

Article 500 Hazardous (Classified) Locations, Classes I, II, and III, Divisions 1 and 2

500.1 Scope — Articles 500 Through 504
500.3 Other Articles
500.4 General

(A) Documentation
(B) Reference Standards
500.5 Classifications of Locations

(A) General
(B) Class I Locations
(C) Class II Locations
(D) Class III Locations

500.6 Material Groups

(A) Class I Group Classifications
(B) Class II Group Classifications
500.7 Protection Techniques

(A) Explosionproof Equipment
(B) Dust Ignitionproof
(C) Dusttight
(D) Purged and Pressurized
## Article 501 Class I Locations

### Part I. General

#### 501.1 Scope

- (A) Class I, Division 1
- (B) Class I, Division 2

#### 501.5 Zone Equipment

- (A) Class I, Division 1
- (B) Class I, Division 2

### Part II. Wiring

#### 501.10 Wiring Methods

- (A) Class I, Division 1
- (B) Class I, Division 2

#### 501.15 Sealing and Drainage

- (A) Conduit Seals, Class I, Division 1
- (B) Conduit Seals, Class I, Division 2
- (C) Class I, Divisions 1 and 2
- (D) Cable Seals, Class I, Division 1
- (E) Cable Seals, Class I, Division 2
- (F) Drainage

#### 501.17 Process Sealing

- (A) Class I, Division 1
- (B) Class I, Division 2

#### 501.20 Conductor Insulation, Class I, Divisions 1 and 2

- (A) Class I, Division 1
- (B) Class I, Division 2

### Part III. Equipment

#### 501.100 Transformers and Capacitors

- (A) Class I, Division 1
- (B) Class I, Division 2

#### 501.105 Meters, Instruments, and Relays

- (A) Class I, Division 1
- (B) Class I, Division 2

#### 501.115 Switches, Circuit Breakers, Motor Controllers, and Fuses

- (A) Class I, Division 1
- (B) Class I, Division 2

#### 501.120 Control Transformers and Resistors

- (A) Class I, Division 1
- (B) Class I, Division 2

#### 501.125 Motors and Generators

- (A) Class I, Division 1
- (B) Class I, Division 2

#### 501.130 Luminaires

#### 501.135 Utilization Equipment

#### 501.140 Flexible Cords, Class I, Divisions 1 and 2

#### 501.25 Uninsulated Exposed Parts, Class I, Divisions 1 and 2

#### 501.30 Grounding and Bonding, Class I, Divisions 1 and 2

#### 501.35 Surge Protection

- (A) Class I, Division 1
- (B) Class I, Division 2

#### 501.100 Transformers and Capacitors

- (A) Class I, Division 1
- (B) Class I, Division 2

#### 501.105 Meters, Instruments, and Relays

- (A) Class I, Division 1
- (B) Class I, Division 2

#### 501.115 Switches, Circuit Breakers, Motor Controllers, and Fuses

- (A) Class I, Division 1
- (B) Class I, Division 2
Article 502 Class II Locations

Part I. General

502.1 Scope
502.5 Explosionproof Equipment
502.6 Zone Equipment

Part II. Wiring

502.10 Wiring Methods
(A) Class II, Division 1
(B) Class II, Division 2
502.15 Sealing, Class II, Divisions 1 and 2
502.25 Uninsulated Exposed Parts, Class II, Divisions 1 and 2
502.30 Grounding and Bonding, Class II, Divisions 1 and 2
(A) Bonding
(B) Types of Equipment Grounding Conductors
502.35 Surge Protection — Class II, Divisions 1 and 2

Part III. Equipment

502.100 Transformers and Capacitors
(A) Class II, Division 1
(B) Class II, Division 2
502.115 Switches, Circuit Breakers, Motor Controllers, and Fuses
(A) Class II, Division 1

Article 503 Class III Locations

Part I. General

503.1 Scope
503.5 General
503.6 Zone Equipment

Part II. Wiring
503.10 Wiring Methods
   (A) Class III, Division 1
   (B) Class III, Division 2
503.25 Uninsulated Exposed Parts, Class III, Divisions 1 and 2
503.30 Grounding and Bonding — Class III, Divisions 1 and 2
   (A) Bonding
   (B) Types of Equipment Bonding Conductors

Part III. Equipment
503.100 Transformers and Capacitors — Class III, Divisions 1 and 2
503.115 Switches, Circuit Breakers, Motor Controllers, and Fuses — Class III, Divisions 1 and 2
503.120 Control Transformers and Resistors — Class III, Divisions 1 and 2
503.125 Motors and Generators — Class III, Divisions 1 and 2
503.128 Ventilating Piping — Class III, Divisions 1 and 2
503.130 Luminaires — Class III, Divisions 1 and 2
   (A) Fixed Lighting
   (B) Physical Damage
   (C) Pendant Luminaires
   (D) Portable Lighting Equipment
503.135 Utilization Equipment — Class III, Divisions 1 and 2
   (A) Heaters
   (B) Motors
   (C) Switches, Circuit Breakers, Motor Controllers, and Fuses
503.140 Flexible Cords — Class III, Divisions 1 and 2
503.145 Receptacles and Attachment Plugs — Class III, Divisions 1 and 2
503.150 Signaling, Alarm, Remote-Control, and Local Loudspeaker Intercommunications Systems — Class III, Divisions 1 and 2
503.155 Electric Cranes, Hoists, and Similar Equipment — Class III, Divisions 1 and 2
   (A) Power Supply
   (B) Contact Conductors
   (C) Current Collectors
   (D) Control Equipment
503.160 Storage Battery Charging Equipment — Class III, Divisions 1 and 2

Article 504 Intrinsically Safe Systems
504.1 Scope
504.2 Definitions
504.3 Application of Other Articles
504.4 Equipment
504.10 Equipment Installation
   (A) Control Drawing
   (B) Location
   (C) Enclosures
   (D) Simple Apparatus
504.20 Wiring Methods
504.30 Separation of Intrinsically Safe Conductors
   (A) From Nonintrinsically Safe Circuit Conductors
   (B) From Different Intrinsically Safe Circuit Conductors
   (C) From Grounded Metal
504.50 Grounding
   (A) Intrinsically Safe Apparatus, Enclosures, and Raceways
   (B) Associated Apparatus and Cable Shields
   (C) Connection to Grounding Electrodes
504.60 Bonding
(A) Intrinsically Safe Apparatus
(B) Metal Raceways
504.70 Sealing
504.80 Identification
(A) Terminals
(B) Wiring
(C) Color Coding

Article 505 Zone 0, 1, and 2 Locations

505.1 Scope
505.2 Definitions
505.3 Other Articles
505.4 General
(A) Documentation for Industrial Occupancies
(B) Reference Standards
505.5 Classifications of Locations
(A) General
(B) Class I, Zone 0, 1, and 2 Locations
505.6 Material Groups
(A) Group IIC
(B) Group IIB
(C) Group IIA
505.7 Special Precaution
(A) Implementation of Zone Classification System
(B) Dual Classification
(C) Reclassification Permitted
(D) Solid Obstacles
(E) Simultaneous Presence of Flammable Gases and Combustible Dusts or Fibers/Flyings
(F) Available Short-Circuit Current for Type of Protection “e”
505.8 Protection Techniques
(A) Flameproof “d”
(B) Pressurization “p”
505.9 Equipment
(A) Suitability
(B) Listing
(C) Marking
(D) Class I Temperature
(E) Threading
(F) Optical Fiber Cables
505.15 Wiring Methods
(A) Class I, Zone 0
(B) Class I, Zone 1
(C) Class I, Zone 2
505.16 Sealing and Drainage
(A) Zone 0
(B) Zone 1
(C) Zone 2
(D) Class I, Zones 0, 1, and 2
(E) Drainage
505.17 Flexible Cables, Cords and Connections
(A) Flexible Cords, Class I, Zones 1 and 2
(B) Instrumentation Connections for Zone 2
505.18 Conductors and Conductor Insulation
(A) Conductors
(B) Conductor Insulation
505.19 Uninsulated Exposed Parts
505.20 Equipment Requirements
(A) Zone 0
(B) Zone 1
(C) Zone 2
(D) Materials
(E) Manufacturer’s Instructions
505.22 Increased Safety “e” Motors and Generators
505.25 Grounding and Bonding
(A) Bonding
(B) Types of Equipment Grounding Conductors
505.26 Process Sealing

Article 506 Zone 20, 21, and 22 Locations for Combustible Dusts or Ignitible Fibers/Flyings
506.1 Scope
506.2 Definitions
506.3 Other Articles
506.4 General
(A) Documentation for Industrial Occupancies
(B) Reference Standards
506.5 Classification of Locations
(A) Classifications of Locations
(B) Zone 20, Zone 21, and Zone 22 Locations
506.6 Material Groups
(A) Group IIIC
(B) Group IIIB
(C) Group IIIA
506.7 Special Precaution
(A) Implementation of Zone Classification System
(B) Dual Classification
(C) Reclassification Permitted
(D) Simultaneous Presence of Flammable Gases and Combustible Dusts or Fibers/Flyings
506.8 Protection Techniques
(A) Dust Ignitionproof
(B) Pressurized

Article 510 Hazardous (Classified) Locations — Specific
510.1 Scope
510.2 General

**Article 511 Commercial Garages, Repair and Storage**

511.1 Scope

511.2 Definitions

511.3 Area Classification, General

(A) Parking Garages

(B) Repair Garages, with Dispensing

(C) Repair Garages, Major and Minor

(D) Repair Garages, Major

(E) Modifications to Classification

511.4 Wiring and Equipment in Class I Locations

(A) Wiring Located in Class I Locations

(B) Equipment Located in Class I Locations

511.7 Wiring and Equipment Installed Above Class I Locations

(A) Wiring in Spaces Above Class I Locations

(B) Electrical Equipment Installed Above Class I Locations

511.8 Underground Wiring

511.9 Sealing

511.10 Special Equipment

(A) Battery Charging Equipment

(B) Electric Vehicle Charging Equipment

511.12 Ground-Fault Circuit-Interrupter Protection for Personnel

511.16 Grounding and Bonding Requirements

(A) General Grounding Requirements

(B) Supplying Circuits with Grounded and Grounding Conductors in Class I Locations

**Article 513 Aircraft Hangars**

513.1 Scope

513.2 Definitions

513.3 Classification of Locations

(A) Below Floor Level

(B) Areas Not Cut Off or Ventilated

(C) Vicinity of Aircraft

(D) Areas Suitably Cut Off and Ventilated

513.4 Wiring and Equipment in Class I Locations

(A) General

(B) Stanchions, Rostrums, and Docks

513.7 Wiring and Equipment Not Installed in Class I Locations

(A) Fixed Wiring

(B) Pendants

(C) Arcing Equipment

(D) Lampholders

(E) Stanchions, Rostrums, or Docks

(F) Mobile Stanchions

513.8 Underground Wiring

(A) Wiring and Equipment Embedded, Under Slab, or Underground

(B) Uninterrupted Raceways, Embedded, Under Slab, or Underground

513.9 Sealing

513.10 Special Equipment

(A) Aircraft Electrical Systems

(B) Aircraft Battery Charging and Equipment

(C) External Power Sources for Energizing Aircraft

(D) Mobile Servicing Equipment with Electrical Components

(E) Portable Equipment

513.12 Ground-Fault Circuit-Interrupter Protection for Personnel

513.16 Grounding and Bonding Requirements

(A) General Grounding Requirements

(B) Supplying Circuits with Grounded and Grounding Conductors in Class I Locations
Article 514 Motor Fuel Dispensing Facilities
514.1 Scope
514.2 Definition
514.3 Classification of Locations
(A) Unclassified Locations
(B) Classified Locations
(C) Motor Fuel Dispensing Stations in Boatyards and Marinas
(D) Closed Construction
(E) Open Construction
514.4 Wiring and Equipment Installed in Class I Locations
514.7 Wiring and Equipment Above Class I Locations
514.8 Underground Wiring
514.9 Sealing
(A) At Dispenser
(B) At Boundary
514.11 Circuit Disconnects
(A) Emergency Electrical Disconnects
(B) Attended Self-Service Motor Fuel Dispensing Facilities
(C) Unattended Self-Service Motor Fuel Dispensing Facilities
514.13 Provisions for Maintenance and Service of Dispensing Equipment
514.16 Grounding and Bonding
Article 515 Bulk Storage Plants
515.1 Scope
515.3 Class I Locations
515.4 Wiring and Equipment Located in Class I Locations
515.7 Wiring and Equipment Above Class I Locations
(A) Fixed Wiring
(B) Fixed Equipment
(C) Portable Luminaires or Other Utilization
515.8 Underground Wiring
(A) Wiring Method
(B) Insulation
(C) Nonmetallic Wiring
515.9 Sealing
515.10 Special Equipment — Gasoline Dispensers
515.16 Grounding and Bonding
Article 516 Spray Application, Dipping, Coating, and Printing Processes Using Flammable or Combustible Materials
Part I. General
516.1 Scope
516.2 Definitions
Part II. Open Containers
516.4 Area Classification
516.5 Area Classification
(A) Zone Classification of Locations
(B) Class I, Division 1 or Class I, Zone 0 Locations
(C) Class I, Division 1; Class I, Zone 1; Class II, Division 1; or Zone 21 Locations
(D) Class I, Division 2; Class I, Zone 2; Class II, Division 2; or Zone 22 Locations
516.6 Wiring and Equipment in Class I Locations
(A) Wiring and Equipment — Vapors
(B) Wiring and Equipment — Vapors and Residues
(C) Illumination
(D) Portable Equipment
(E) Electrostatic Equipment
(F) Static Electric Discharges
516.7 Wiring and Equipment Not Within Classified
Locations

(A) Wiring

(B) Equipment

516.10 Special Equipment

(A) Fixed Electrostatic Equipment

(B) Hand-Spraying Electrostatic Equipment

(C) Powder Coating

516.16 Grounding

Part IV. Spray Application Operations in Membrane Enclosures

516.18 Area Classification for Temporary Membrane Enclosures

516.23 Electrical and Other Sources of Ignition

Part V. Printing, Dipping, and Coating Processes

516.29 Classification of Locations

516.35 Areas Adjacent to Enclosed Dipping and Coating Processes

516.36 Equipment and Containers in Ventilated Areas

516.37 Luminaires

516.38 Wiring and Equipment Not Within Classified Locations

(A) Wiring

(B) Equipment

516.40 Static Electric Discharges

Article 517 Health Care Facilities

Part I. General

517.1 Scope

517.2 Definitions

Part II. Wiring and Protection

517.10 Applicability

(A) Applicability

(B) Not Covered

517.11 General Installation — Construction Criteria

517.12 Wiring Methods

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

(A) Wiring Methods

(B) Insulated Equipment Grounding Conductors and Insulated Equipment Bonding Jumpers

517.14 Panelboard Bonding

517.16 Use of Isolated Ground Receptacles

(A) Inside of a Patient Care Vicinity

(B) Outside of a Patient Care Vicinity

517.17 Ground-Fault Protection

(A) Applicability

(B) Feeders

(C) Selectivity

(D) Testing

517.18 General Care (Category 2) Spaces

(A) Patient Bed Location

(B) Patient Bed Location Receptacles

(C) Designated General Care (Category 2) Pediatric Locations

517.19 Critical Care (Category 1) Spaces

(A) Patient Bed Location Branch Circuits

(B) Patient Bed Location Receptacles

(C) Operating Room Receptacles

(D) Patient Care Vicinity Grounding and Bonding (Optional)

(E) Equipment Grounding and Bonding

(F) Additional Protective Techniques in Critical Care (Category 1) Spaces (Optional)

(G) Isolated Power System Equipment Grounding

(H) Special-Purpose Receptacle Grounding

517.20 Wet Procedure Locations

(A) Receptacles and Fixed Equipment
### 2017 NEC Table of Contents

(B) Isolated Power Systems
517.21 Ground-Fault Circuit-Interrupter Protection for Personnel

Part III. Essential Electrical System
517.25 Scope
517.26 Application of Other Articles
517.29 Essential Electrical Systems for Hospitals and Other Health Care Facilities
(A) Applicability
(B) Critical Care (Category 1)

517.30 Sources of Power
(A) Two Independent Power Sources
(B) Types of Power Sources
(C) Location of Essential Electrical System Components

517.31 Requirements for the Essential Electrical System
(A) Separate Branches
(B) Transfer Switches
(C) Wiring Requirements
(D) Capacity of Systems
(E) Receptacle Identification
(F) Feeders from Alternate Power Source
(G) Coordination

517.32 Branches Requiring Automatic Connection
517.33 Life Safety Branch
(A) Illumination of Means of Egress
(B) Exit Signs
(C) Alarm and Alerting Systems
(D) Communications Systems
(E) Generator Set Locations
(F) Generator Set Accessories
(G) Elevators
(H) Automatic Doors

517.34 Critical Branch
(A) Task Illumination and Selected Receptacles
(B) Switching
(C) Subdivision of the Critical Branch

517.35 Equipment Branch Connection to Alternate Power Source
(A) Equipment for Delayed Automatic Connection
(B) Equipment for Delayed Automatic or Manual Connection
(C) AC Equipment for Nondelayed Automatic Connection

517.40 Type 2 Essential Electrical Systems for Nursing Homes and Limited Care Facilities
(A) Applicability
(B) Inpatient Hospital Care Facilities
(C) Facilities Contiguous or Located on the Same Site with Hospitals

517.41 Required Power Sources
(A) Two Independent Power Sources
(B) Types of Power Sources
(C) Location of Essential Electrical System Components

517.42 Essential Electrical Systems
(A) General
(B) Transfer Switches
(C) Capacity of System
(D) Separation from Other Circuits
(E) Receptacle Identification

517.43 Automatic Connection to Life Safety Branch
(A) Illumination of Means of Egress
(B) Exit Signs
(C) Alarm and Alerting Systems
(D) Communications Systems

(E) Dining and Recreation Areas

(F) Generator Set Location

(G) Elevators

517.44 Connection to Equipment Branch

(A) Delayed Automatic Connections to Equipment Branch

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

517.45 Essential Electrical Systems for Other Health Care Facilities

(A) Essential Electrical Distribution

(B) Electrical Life Support Equipment

(C) Critical Care (Category 1) Patient Care Spaces

(D) General Care (Category 2) Patent Care Spaces

(E) Power Systems

Part IV. Inhalation Anesthetizing Locations

517.60 Anesthetizing Location Classification

(A) Hazardous (Classified) Location

(B) Other-Than-Hazardous (Classified) Location

517.61 Wiring and Equipment

(A) Within Hazardous (Classified) Anesthetizing Locations

(B) Above Hazardous (Classified) Anesthetizing Locations

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

517.62 Grounding

517.63 Grounded Power Systems in Anesthetizing Locations

(A) Battery-Powered Lighting Units

(B) Branch-Circuit Wiring

(C) Fixed Lighting Branch Circuits

517.64 Low-Voltage Equipment and Instruments

(A) Equipment Requirements

(B) Power Supplies

(C) Isolated Circuits

(D) Controls

(E) Battery-Powered Appliances

(F) Receptacles or Attachment Plugs

Part V. X-Ray Installations

517.70 Applicability

517.71 Connection to Supply Circuit

(A) Fixed and Stationary Equipment

(B) Portable, Mobile, and Transportable Equipment

(C) Over 1000-Volt Supply

517.72 Disconnecting Means

(A) Capacity

(B) Location

(C) Portable Equipment

517.73 Rating of Supply Conductors and Overcurrent Protection

(A) Diagnostic Equipment

(B) Therapeutic Equipment

517.74 Control Circuit Conductors

517.75 Equipment Installations

517.76 Transformers and Capacitors

517.77 Installation of High-Tension X-Ray Cables

517.78 Guarding and Grounding

(A) High-Voltage Parts

(B) Low-Voltage Cables
(C) Non–Current-Carrying Metal Parts

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

517.80 Patient Care Spaces

517.81 Other-Than-Patient-Care Areas

517.82 Signal Transmission Between Appliances

(A) General

(B) Common Signal Grounding Wire

Part VII. Isolated Power Systems

517.160 Isolated Power Systems

(A) Installations

(B) Line Isolation Monitor

Article 518 Assembly Occupancies

518.1 Scope

518.2 General Classification

(A) Examples

(B) Multiple Occupancies

(C) Theatrical Areas

518.3 Other Articles

(A) Hazardous (Classified) Areas

(B) Temporary Wiring

(C) Emergency Systems

518.4 Wiring Methods

(A) General

(B) Nonrated Construction

(C) Spaces with Finish Rating

518.5 Supply

Article 520 Theaters, Audience Areas of Motion Picture and Television Studios, Performance Areas, and Similar Locations

Part I. General

520.1 Scope

520.2 Definitions

520.3 Motion Picture Projectors

520.4 Audio Signal Processing, Amplification, and Reproduction Equipment

520.5 Wiring Methods

(A) General

(B) Portable Equipment

(C) Nonrated Construction

520.6 Number of Conductors in Raceway

520.7 Enclosing and Guarding Live Parts

520.8 Emergency Systems

520.9 Branch Circuits

520.10 Portable Equipment Used Outdoors

Part II. Fixed Stage Switchboards

520.21 General

520.25 Dimmers

(A) Disconnection and Overcurrent Protection

(B) Resistance- or Reactor-Type Dimmers

(C) Autotransformer-Type Dimmers

(D) Solid-State-Type Dimmers

520.26 Type of Switchboard

(A) Manual

(B) Remotely Controlled

(C) Intermediate

(D) Constant Power

520.27 Stage Switchboard Feeders

(A) Type of Feeder

(B) Neutral Conductor

(C) Supply Capacity

Part III. Fixed Stage Equipment Other Than Switchboards

520.40 Stage Lighting Hoists
<table>
<thead>
<tr>
<th>Section</th>
<th>Subsections</th>
</tr>
</thead>
<tbody>
<tr>
<td>520.41 Circuit Loads</td>
<td>(A) Circuits Rated 20 Amperes or Less</td>
</tr>
<tr>
<td></td>
<td>(B) Circuits Rated Greater Than 20 Amperes</td>
</tr>
<tr>
<td>520.42 Conductor Insulation</td>
<td></td>
</tr>
<tr>
<td>520.43 Footlights</td>
<td>(A) Metal Trough Construction</td>
</tr>
<tr>
<td></td>
<td>(B) Other-Than-Metal Trough Construction</td>
</tr>
<tr>
<td></td>
<td>(C) Disappearing Footlights</td>
</tr>
<tr>
<td>520.44 Borders, Proscenium Sidelights, Drop Boxes, and Connector Strips</td>
<td>(A) General</td>
</tr>
<tr>
<td></td>
<td>(B) Connector Strips and Drop Boxes</td>
</tr>
<tr>
<td></td>
<td>(C) Cords and Cables for Border Lights, Drop Boxes, and Connector Strips</td>
</tr>
<tr>
<td>520.45 Receptacles</td>
<td></td>
</tr>
<tr>
<td>520.46 Connector Strips, Drop Boxes, Floor Pockets, and Other Outlet</td>
<td></td>
</tr>
<tr>
<td>Enclosures</td>
<td></td>
</tr>
<tr>
<td>520.47 Backstage Lamps (Bare Bulbs)</td>
<td></td>
</tr>
<tr>
<td>520.48 Curtain Machines</td>
<td></td>
</tr>
<tr>
<td>520.49 Smoke Ventilator Control</td>
<td></td>
</tr>
<tr>
<td>Part IV. Portable Switchboards on Stage</td>
<td></td>
</tr>
<tr>
<td>520.50 Road Show Connection Panel (A Type of Patch Panel)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(A) Load Circuits</td>
</tr>
<tr>
<td></td>
<td>(B) Circuit Transfer</td>
</tr>
<tr>
<td></td>
<td>(C) Overcurrent Protection</td>
</tr>
<tr>
<td></td>
<td>(D) Enclosure</td>
</tr>
<tr>
<td>520.51 Supply</td>
<td></td>
</tr>
<tr>
<td>520.52 Overcurrent Protection for Branch Circuits</td>
<td></td>
</tr>
<tr>
<td>520.53 Construction</td>
<td>(A) Pilot Light</td>
</tr>
<tr>
<td></td>
<td>(B) Neutral Terminal</td>
</tr>
<tr>
<td></td>
<td>(C) Single-Pole Separable Connectors</td>
</tr>
<tr>
<td>Part V. Portable Stage Equipment Other Than Switchboards</td>
<td></td>
</tr>
<tr>
<td>520.61 Arc Lamps</td>
<td></td>
</tr>
<tr>
<td>520.62 Portable Power Distribution Units</td>
<td>(A) Enclosure</td>
</tr>
<tr>
<td></td>
<td>(B) Receptacles and Overcurrent Protection</td>
</tr>
<tr>
<td></td>
<td>(C) Busbars and Terminals</td>
</tr>
<tr>
<td></td>
<td>(D) Flanged Surface Inlets</td>
</tr>
<tr>
<td></td>
<td>(E) Cable Arrangement</td>
</tr>
<tr>
<td></td>
<td>(F) Single-Conductor Feeders</td>
</tr>
<tr>
<td></td>
<td>520.63 Bracket Fixture Wiring</td>
</tr>
<tr>
<td></td>
<td>(A) Bracket Wiring</td>
</tr>
<tr>
<td></td>
<td>(B) Mounting</td>
</tr>
<tr>
<td></td>
<td>520.64 Portable Strips</td>
</tr>
<tr>
<td></td>
<td>520.65 Festoons</td>
</tr>
<tr>
<td></td>
<td>520.66 Special Effects</td>
</tr>
<tr>
<td></td>
<td>520.67 Multipole Branch-Circuit Cable Connectors</td>
</tr>
<tr>
<td></td>
<td>520.68 Conductors for Portables</td>
</tr>
<tr>
<td></td>
<td>(A) Conductor Type</td>
</tr>
</tbody>
</table>
(B) Conductor Ampacity

(C) Overcurrent Protection

520.69 Adapters

(A) No Reduction in Current Rating

(B) Connectors

(C) Conductor Type

Part VI. Dressing Rooms, Dressing Areas, and Makeup Areas

520.71 Pendant Lampholders

520.72 Lamp Guards

520.73 Switches Required

520.74 Pilot Lights Required

Part VII. Grounding

520.81 Grounding

Article 522 Control Systems for Permanent Amusement Attractions

Part I. General

522.1 Scope

522.2 Definitions

522.5 Voltage Limitations

522.7 Maintenance

Part II. Control Circuits

522.10 Power Sources for Control Circuits

(A) Power-Limited Control Circuits

(B) Non–Power-Limited Control Circuits

Part III. Control Circuit Wiring Methods

522.20 Conductors, Busbars, and Slip Rings

522.21 Conductor Sizing

(A) Conductors Within a Listed Component or Assembly

(B) Conductors Within an Enclosure or Operator Station

(C) Conductors Outside of an Enclosure

522.22 Conductor Ampacity

522.23 Overcurrent Protection for Conductors

522.24 Conductors of Different Circuits in the Same Cable, Cable Tray, Enclosure, or Raceway

(A) Two or More Control Circuits

(B) Control Circuits with Power Circuits

522.25 Ungrounded Control Circuits

522.28 Control Circuits in Wet Locations

Article 525 Carnivals, Circuses, Fairs, and Similar Events

Part I. General Requirements

525.1 Scope

525.2 Definitions

525.3 Other Articles

(A) Portable Wiring and Equipment

(B) Permanent Structures

(C) Audio Signal Processing, Amplification, and Reproduction Equipment

(D) Attractions Utilizing Pools, Fountains, and Similar Installations with Contained Volumes of Water

525.5 Overhead Conductor Clearances

(A) Vertical Clearances

(B) Clearance to Portable Structures

525.6 Protection of Electrical Equipment

Part II. Power Sources

525.10 Services

(A) Guarding

(B) Mounting and Location

525.11 Multiple Sources of Supply

Part III. Wiring Methods

525.20 Wiring Methods
<table>
<thead>
<tr>
<th>Article</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>530.20</td>
<td>Grounding</td>
</tr>
<tr>
<td>530.21</td>
<td>Plugs and Receptacles</td>
</tr>
<tr>
<td>(A) Rating</td>
<td></td>
</tr>
<tr>
<td>(B) Interchangeability</td>
<td></td>
</tr>
<tr>
<td>530.22</td>
<td>Single-Pole Separable Connectors</td>
</tr>
<tr>
<td>(A) General</td>
<td></td>
</tr>
<tr>
<td>(B) Interchangeability</td>
<td></td>
</tr>
<tr>
<td>530.23</td>
<td>Branch Circuits</td>
</tr>
<tr>
<td>Part III. Dressing Rooms</td>
<td></td>
</tr>
<tr>
<td>530.31</td>
<td>Dressing Rooms</td>
</tr>
<tr>
<td>Part IV. Viewing, Cutting, and Patching Tables</td>
<td></td>
</tr>
<tr>
<td>530.41</td>
<td>Lamps at Tables</td>
</tr>
<tr>
<td>Part V. Cellulose Nitrate Film Storage Vaults</td>
<td></td>
</tr>
<tr>
<td>530.51</td>
<td>Lamps in Cellulose Nitrate Film Storage Vaults</td>
</tr>
<tr>
<td>530.52</td>
<td>Electrical Equipment in Cellulose Nitrate Film Storage Vaults</td>
</tr>
<tr>
<td>Part VI. Substations</td>
<td></td>
</tr>
<tr>
<td>530.61</td>
<td>Substations</td>
</tr>
<tr>
<td>530.62</td>
<td>Portable Substations</td>
</tr>
<tr>
<td>530.63</td>
<td>Overcurrent Protection of Direct-Current Generators</td>
</tr>
<tr>
<td>530.64</td>
<td>Direct-Current Switchboards</td>
</tr>
<tr>
<td>(A) General</td>
<td></td>
</tr>
<tr>
<td>(B) Circuit Breaker Frames</td>
<td></td>
</tr>
<tr>
<td>Article 540 Motion Picture Projection Rooms</td>
<td></td>
</tr>
<tr>
<td>Part I. General</td>
<td></td>
</tr>
<tr>
<td>540.1</td>
<td>Scope</td>
</tr>
<tr>
<td>540.2</td>
<td>Definitions</td>
</tr>
<tr>
<td>540.4</td>
<td>Wiring Methods</td>
</tr>
<tr>
<td>(A) Methods Permitted</td>
<td></td>
</tr>
<tr>
<td>(B) Securing Cables</td>
<td></td>
</tr>
<tr>
<td>540.5</td>
<td>Supply Conductors</td>
</tr>
<tr>
<td>540.6</td>
<td>Installation of Service-Entrance Conductors</td>
</tr>
<tr>
<td>540.7</td>
<td>Service Equipment</td>
</tr>
<tr>
<td>540.8</td>
<td>Protection of Conductors and Equipment</td>
</tr>
<tr>
<td>540.9</td>
<td>Boxes</td>
</tr>
<tr>
<td>Part II. Equipment and Projectors of the Professional Type</td>
<td></td>
</tr>
<tr>
<td>540.10</td>
<td>Motion Picture Projection Room Required</td>
</tr>
<tr>
<td>540.11</td>
<td>Location of Associated Electrical Equipment</td>
</tr>
<tr>
<td>(A) Motor Generator Sets, Transformers, Rectifiers, Rheostats, and Similar Equipment</td>
<td></td>
</tr>
<tr>
<td>(B) Switches, Overcurrent Devices, or Other Equipment</td>
<td></td>
</tr>
<tr>
<td>(C) Emergency Systems</td>
<td></td>
</tr>
<tr>
<td>540.12</td>
<td>Work Space</td>
</tr>
<tr>
<td>540.13</td>
<td>Conductor Size</td>
</tr>
<tr>
<td>540.14</td>
<td>Conductors on Lamps and Hot Equipment</td>
</tr>
<tr>
<td>540.15</td>
<td>Flexible Cords</td>
</tr>
<tr>
<td>540.20</td>
<td>Listing Requirements</td>
</tr>
<tr>
<td>540.21</td>
<td>Marking</td>
</tr>
<tr>
<td>Part III. Nonprofessional Projectors</td>
<td></td>
</tr>
<tr>
<td>540.31</td>
<td>Motion Picture Projection Room Not Required</td>
</tr>
<tr>
<td>540.32</td>
<td>Listing Requirements</td>
</tr>
<tr>
<td>Part IV. Audio Signal Processing, Amplification, and Reproduction Equipment</td>
<td></td>
</tr>
<tr>
<td>540.50</td>
<td>Audio Signal Processing, Amplification, and Reproduction Equipment</td>
</tr>
<tr>
<td>Article 545 Manufactured Buildings</td>
<td></td>
</tr>
<tr>
<td>545.1</td>
<td>Scope</td>
</tr>
<tr>
<td>545.2</td>
<td>Definitions</td>
</tr>
<tr>
<td>545.4</td>
<td>Wiring Methods</td>
</tr>
<tr>
<td>(A) Other Dimensions</td>
<td></td>
</tr>
<tr>
<td>(B) Not Over 1650 cm³ (100 in.³)</td>
<td></td>
</tr>
<tr>
<td>545.5</td>
<td>Supply Conductors</td>
</tr>
<tr>
<td>545.6</td>
<td>Installation of Service-Entrance Conductors</td>
</tr>
<tr>
<td>545.7</td>
<td>Service Equipment</td>
</tr>
<tr>
<td>545.8</td>
<td>Protection of Conductors and Equipment</td>
</tr>
<tr>
<td>545.9</td>
<td>Boxes</td>
</tr>
<tr>
<td>545.10</td>
<td>Receptacle or Switch with Integral Enclosure</td>
</tr>
<tr>
<td>545.11</td>
<td>Bonding and Grounding</td>
</tr>
<tr>
<td>545.12</td>
<td>Grounding Electrode Conductor</td>
</tr>
</tbody>
</table>
545.13 Component Interconnections

Article 547 Agricultural Buildings
547.1 Scope
(A) Excessive Dust and Dust with Water
(B) Corrosive Atmosphere
547.2 Definitions
547.3 Other Articles
547.4 Surface Temperatures
547.5 Wiring Methods
(A) Wiring Systems
(B) Mounting
(C) Equipment Enclosures, Boxes, Conduit Bodies, and Fittings
(D) Flexible Connections
(E) Physical Protection
(F) Separate Equipment Grounding Conductor
(G) Receptacles
547.6 Switches, Receptacles, Circuit Breakers, Controllers, and Fuses
547.7 Motors
547.8 Luminaires
(A) Minimize the Entrance of Dust
(B) Exposed to Physical Damage
(C) Exposed to Water
547.9 Electrical Supply to Building(s) or Structure(s) from a Distribution Point
(A) Site-Isolating Device
(B) Service Disconnecting Means and Overcurrent Protection at the Building(s) or Structure(s)
(C) Service Disconnecting Means and Overcurrent Protection at the Distribution Point
(D) Identification
547.10 Equipotential Planes and Bonding of Equipotential Planes

Article 550 Mobile Homes, Manufactured Homes, and Mobile Home Parks
Part I. General
550.1 Scope
550.2 Definitions
550.4 General Requirements
(A) Mobile Home Not Intended as a Dwelling Unit
(B) In Other Than Mobile Home Parks
(C) Connection to Wiring System
(D) Listed and Labeled
Part II. Mobile and Manufactured Homes
550.10 Power Supply
(A) Feeder
(B) Power-Supply Cord
(C) Attachment Plug Cap
(D) Overall Length of a Power-Supply Cord
(E) Marking
(F) Point of Entrance
(G) Protected
(H) Protection Against Corrosion and Mechanical Damage
(I) Mast Weatherhead or Raceway
550.11 Disconnecting Means and Branch-Circuit Protective Equipment
(A) Disconnecting Means
(B) Branch-Circuit Protective Equipment
(C) Two-Pole Circuit Breakers
(D) Electrical Nameplates
550.12 Branch Circuits
(A) Lighting
### 550.13 Receptacle Outlets
- **(A)** Grounding-Type Receptacle Outlets
- **(B)** Ground-Fault Circuit Interrupters (GFCI)
- **(C)** Cord-Connected Fixed Appliance
- **(D)** Receptacle Outlets Required
- **(E)** Pipe Heating Cable(s) Outlet
- **(F)** Receptacle Outlets Not Permitted
- **(G)** Receptacle Outlets Not Required

### 550.14 Luminaires and Appliances
- **(A)** Fasten Appliances in Transit
- **(B)** Accessibility
- **(C)** Pendants
- **(D)** Bathtub and Shower Luminaires

### 550.15 Wiring Methods and Materials
- **(A)** Nonmetallic Boxes
- **(B)** Nonmetallic Cable Protection
- **(C)** Metal-Covered and Nonmetallic Cable Protection
- **(D)** Metal Faceplates
- **(E)** Installation Requirements
- **(F)** Raceways
- **(G)** Switches
- **(H)** Under-Chassis Wiring (Exposed to Weather)
- **(I)** Boxes, Fittings, and Cabinets
- **(J)** Appliance Terminal Connections
- **(K)** Component Interconnections

### 550.16 Grounding
- **(A)** Grounded Conductor
- **(B)** Equipment Grounding Means
- **(C)** Bonding of Non–Current-Carrying Metal Parts
- **(D)** Additional Outside Electrical Equipment
- **(E)** Additional Receptacles

### 550.17 Testing
- **(A)** Dielectric Strength Test
- **(B)** Continuity and Operational Tests and Polarity Checks

### 550.18 Calculations
- **(A)** Lighting, Small-Appliance, and Laundry Load
- **(B)** Total Load for Determining Power Supply
- **(C)** Optional Method of Calculation for Lighting and Appliance Load

### 550.19 Interconnection of Multiple-Section Mobile or Manufactured Home Units

### 550.20 Outdoor Outlets, Luminaires, Air-Cooling Equipment, and So Forth
- **(A)** Wiring Methods
- **(B)** Disconnecting Means

### 550.25 Arc-Fault Circuit-Interrupter Protection
- **(A)** Definition
- **(B)** Mobile Homes and Manufactured Homes

### Part III. Services and Feeders
- **550.30 Distribution System**
- **550.31 Allowable Demand Factors**
- **550.32 Service Equipment**
- **(A)** Mobile Home Service Equipment
- **(B)** Manufactured Home Service Equipment
- **(C)** Rating
- **(D)** Additional Outside Electrical Equipment
### Article 551 Recreational Vehicles and Recreational Vehicle Parks

#### Part I. General

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>551.1</td>
<td>Scope</td>
</tr>
<tr>
<td>551.2</td>
<td>Definitions</td>
</tr>
<tr>
<td>551.4</td>
<td>General Requirements</td>
</tr>
<tr>
<td>(A) Not Covered</td>
<td></td>
</tr>
<tr>
<td>(B) Systems</td>
<td></td>
</tr>
<tr>
<td>(C) Labels</td>
<td></td>
</tr>
</tbody>
</table>

#### Part II. Combination Electrical Systems

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>551.20</td>
<td>Combination Electrical Systems</td>
</tr>
<tr>
<td>(A) General</td>
<td></td>
</tr>
<tr>
<td>(B) Voltage Converters (120-Volt Alternating Current to Low-Voltage Direct Current)</td>
<td></td>
</tr>
<tr>
<td>(C) Bonding Voltage Converter Enclosures</td>
<td></td>
</tr>
<tr>
<td>(D) Dual-Voltage Fixtures, Including Luminaires or Appliances</td>
<td></td>
</tr>
<tr>
<td>(E) Autotransformers</td>
<td></td>
</tr>
<tr>
<td>(F) Receptacles and Plug Caps</td>
<td></td>
</tr>
</tbody>
</table>

#### Part III. Other Power Sources

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>551.30</td>
<td>Generator Installations</td>
</tr>
<tr>
<td>(A) Mounting</td>
<td></td>
</tr>
<tr>
<td>(B) Generator Protection</td>
<td></td>
</tr>
<tr>
<td>(C) Installation of Storage Batteries and Generators</td>
<td></td>
</tr>
<tr>
<td>(D) Ventilation of Generator Compartments</td>
<td></td>
</tr>
<tr>
<td>(E) Supply Conductors</td>
<td></td>
</tr>
</tbody>
</table>

#### Part IV. Nominal 120-Volt or 120/240-Volt Systems

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>551.40</td>
<td>120-Volt or 120/240-Volt, Nominal, Systems</td>
</tr>
<tr>
<td>(A) General Requirements</td>
<td></td>
</tr>
<tr>
<td>(B) Materials and Equipment</td>
<td></td>
</tr>
<tr>
<td>(C) Ground-Fault Circuit-Interrupter Protection</td>
<td></td>
</tr>
<tr>
<td>551.41</td>
<td>Receptacle Outlets Required</td>
</tr>
<tr>
<td>(A) Spacing</td>
<td></td>
</tr>
<tr>
<td>(B) Location</td>
<td></td>
</tr>
<tr>
<td>(C) Ground-Fault Circuit-Interrupter Protection</td>
<td></td>
</tr>
<tr>
<td>551.42</td>
<td>Branch Circuits Required</td>
</tr>
<tr>
<td>(A) One 15-Ampere Circuit</td>
<td></td>
</tr>
<tr>
<td>(B) One 20-Ampere Circuit</td>
<td></td>
</tr>
<tr>
<td>(C) Two to Five 15- or 20-Ampere Circuits</td>
<td></td>
</tr>
<tr>
<td>(D) More Than Five Circuits Without a Listed Energy Management System</td>
<td></td>
</tr>
</tbody>
</table>

#### 551.43 | Branch-Circuit Protection |
| (A) Rating |
| (B) Protection for Smaller Conductors |
| (C) Fifteen-Ampere Receptacles Considered Protected by 20 Amperes |

#### 551.44 | Power-Supply Assembly |
| (A) Fifteen-Ampere Main Power-Supply Assembly |
| (B) Twenty-Ampere Main Power-Supply Assembly |
| (C) Thirty-Ampere Main Power-Supply Assembly |
| (D) Fifty-Ampere Power-Supply Assembly |

#### 551.45 | Panelboard |
<p>| (A) Listed and Appropriately Rated |</p>
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>(B) Location</td>
<td>551.52 Receptacles</td>
</tr>
<tr>
<td>(C) Dead-Front Type</td>
<td>551.53 Luminaires and Other Equipment</td>
</tr>
<tr>
<td>551.46 Means for Connecting to Power Supply</td>
<td></td>
</tr>
<tr>
<td>(A) Assembly</td>
<td></td>
</tr>
<tr>
<td>(B) Cord</td>
<td></td>
</tr>
<tr>
<td>(C) Attachment Plugs</td>
<td></td>
</tr>
<tr>
<td>(D) Labeling at Electrical Entrance</td>
<td></td>
</tr>
<tr>
<td>(E) Location</td>
<td></td>
</tr>
<tr>
<td>551.47 Wiring Methods</td>
<td></td>
</tr>
<tr>
<td>(A) Wiring Systems</td>
<td></td>
</tr>
<tr>
<td>(B) Conduit and Tubing</td>
<td></td>
</tr>
<tr>
<td>(C) Nonmetallic Boxes</td>
<td></td>
</tr>
<tr>
<td>(D) Boxes</td>
<td></td>
</tr>
<tr>
<td>(E) Mounting</td>
<td></td>
</tr>
<tr>
<td>(F) Raceway and Cable Continuity</td>
<td></td>
</tr>
<tr>
<td>(G) Protected</td>
<td></td>
</tr>
<tr>
<td>(H) Bends</td>
<td></td>
</tr>
<tr>
<td>(I) Cable Supports</td>
<td></td>
</tr>
<tr>
<td>(J) Nonmetallic Box Without Cable Clamps</td>
<td></td>
</tr>
<tr>
<td>(K) Physical Damage</td>
<td></td>
</tr>
<tr>
<td>(L) Receptacle Faceplates</td>
<td></td>
</tr>
<tr>
<td>(M) Metal Faceplates Grounded</td>
<td></td>
</tr>
<tr>
<td>(N) Moisture or Physical Damage</td>
<td></td>
</tr>
<tr>
<td>(O) Component Interconnections</td>
<td></td>
</tr>
<tr>
<td>(P) Method of Connecting Expandable Units</td>
<td></td>
</tr>
<tr>
<td>(Q) Prewiring for Air-Conditioning Installation</td>
<td></td>
</tr>
<tr>
<td>(R) Prewiring for Generator Installation</td>
<td></td>
</tr>
<tr>
<td>(S) Prewiring for Other Circuits</td>
<td></td>
</tr>
<tr>
<td>551.48 Conductors and Boxes</td>
<td></td>
</tr>
<tr>
<td>551.49 Grounded Conductors</td>
<td></td>
</tr>
<tr>
<td>551.50 Connection of Terminals and Splices</td>
<td></td>
</tr>
<tr>
<td>551.51 Switches</td>
<td></td>
</tr>
<tr>
<td>(A) Rating</td>
<td></td>
</tr>
<tr>
<td>Part V. Factory Tests</td>
<td></td>
</tr>
<tr>
<td>Part VI. Recreational Vehicle Parks</td>
<td></td>
</tr>
<tr>
<td>551.60 Factory Tests (Electrical)</td>
<td></td>
</tr>
<tr>
<td>551.71 Type Receptacles Provided</td>
<td></td>
</tr>
</tbody>
</table>
551.72 Distribution System
(A) Systems
(B) Three-Phase Systems
(C) Receptacles
(D) Neutral Conductors

551.73 Calculated Load
(A) Basis of Calculations
(B) Demand Factors

551.74 Overcurrent Protection

551.75 Grounding
(A) General
(B) Grounding Electrode

551.76 Grounding — Recreational Vehicle Site Supply Equipment
(A) Exposed Non–Current-Carrying Metal Parts
(B) Secondary Distribution System
(C) Grounded Conductor Not to Be Used as an Equipment Ground
(D) No Connection on the Load Side

551.77 Recreational Vehicle Site Supply Equipment
(A) Location
(B) Disconnecting Means
(C) Access
(D) Mounting Height
(E) Working Space
(F) Marking

551.78 Protection of Outdoor Equipment
(A) Wet Locations

551.79 Clearance for Overhead Conductors
551.80 Underground Service, Feeder, Branch-Circuit, and Recreational Vehicle Site Feeder-Circuit Conductors

551.81 Receptacles

Article 552 Park Trailers
Part I. General
552.1 Scope
552.2 Definition
552.4 General Requirements
552.5 Labels

Part II. Low-Voltage Systems
552.10 Low-Voltage Systems
(A) Low-Voltage Circuits
(B) Low-Voltage Wiring
(C) Low-Voltage Wiring Methods
(D) Battery Installations
(E) Overcurrent Protection
(F) Switches
(G) Luminaires

Part III. Combination Electrical Systems
552.20 Combination Electrical Systems
(A) General
(B) Voltage Converters (120-Volt Alternating Current to Low-Voltage Direct Current)
(C) Bonding Voltage Converter Enclosures
(D) Dual-Voltage Fixtures Including Luminaires or Appliances
(E) Autotransformers
(F) Receptacles and Plug Caps
### Part IV. Nominal 120-Volt or 120/240-Volt Systems

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>552.40</td>
<td>120-Volt or 120/240-Volt, Nominal, Systems</td>
</tr>
<tr>
<td>(A)</td>
<td>General Requirements</td>
</tr>
<tr>
<td>(B)</td>
<td>Materials and Equipment</td>
</tr>
<tr>
<td>552.41</td>
<td>Receptacle Outlets Required</td>
</tr>
<tr>
<td>(A)</td>
<td>Spacing</td>
</tr>
<tr>
<td>(B)</td>
<td>Location</td>
</tr>
<tr>
<td>(C)</td>
<td>Ground-Fault Circuit-Interrupter Protection</td>
</tr>
<tr>
<td>(D)</td>
<td>Pipe Heating Cable Outlet</td>
</tr>
<tr>
<td>(E)</td>
<td>Outdoor Receptacle Outlets</td>
</tr>
<tr>
<td>(F)</td>
<td>Receptacle Outlets Not Permitted</td>
</tr>
<tr>
<td>552.42</td>
<td>Branch-Circuit Protection</td>
</tr>
<tr>
<td>(A)</td>
<td>Rating</td>
</tr>
<tr>
<td>(B)</td>
<td>Protection for Smaller Conductors</td>
</tr>
<tr>
<td>(C)</td>
<td>Fifteen-Ampere Receptacle Considered</td>
</tr>
<tr>
<td></td>
<td>Protected by 20 Amperes</td>
</tr>
<tr>
<td>552.43</td>
<td>Power Supply</td>
</tr>
<tr>
<td>(A)</td>
<td>Feeder</td>
</tr>
<tr>
<td>(B)</td>
<td>Power-Supply Cord</td>
</tr>
<tr>
<td>(C)</td>
<td>Mast Weatherhead or Raceway</td>
</tr>
<tr>
<td>552.44</td>
<td>Cord</td>
</tr>
<tr>
<td>(A)</td>
<td>Permanently Connected</td>
</tr>
<tr>
<td>(B)</td>
<td>Cord Length</td>
</tr>
<tr>
<td>(C)</td>
<td>Attachment Plugs</td>
</tr>
<tr>
<td>(D)</td>
<td>Labeling at Electrical Entrance</td>
</tr>
<tr>
<td>(E)</td>
<td>Location</td>
</tr>
<tr>
<td>552.45</td>
<td>Panelboard</td>
</tr>
<tr>
<td>(A)</td>
<td>Listed and Appropriately Rated</td>
</tr>
<tr>
<td>(B)</td>
<td>Location</td>
</tr>
<tr>
<td>(C)</td>
<td>Dead-Front Type</td>
</tr>
<tr>
<td>552.46</td>
<td>Branch Circuits</td>
</tr>
<tr>
<td>(A)</td>
<td>Two to Five 15- or 20-Ampere Circuits</td>
</tr>
<tr>
<td>(B)</td>
<td>More Than Five Circuits</td>
</tr>
<tr>
<td>552.47</td>
<td>Calculations</td>
</tr>
<tr>
<td>(A)</td>
<td>Lighting and Small-Appliance Load</td>
</tr>
<tr>
<td>(B)</td>
<td>Total Load for Determining Power Supply</td>
</tr>
<tr>
<td>(C)</td>
<td>Optional Method of Calculation for Lighting and Appliance Load</td>
</tr>
<tr>
<td>552.48</td>
<td>Wiring Methods</td>
</tr>
<tr>
<td>(A)</td>
<td>Wiring Systems</td>
</tr>
<tr>
<td>(B)</td>
<td>Conduit and Tubing</td>
</tr>
<tr>
<td>(C)</td>
<td>Nonmetallic Boxes</td>
</tr>
<tr>
<td>(D)</td>
<td>Boxes</td>
</tr>
<tr>
<td>(E)</td>
<td>Mounting</td>
</tr>
<tr>
<td>(F)</td>
<td>Cable Sheath</td>
</tr>
<tr>
<td>(G)</td>
<td>Protected</td>
</tr>
<tr>
<td>(H)</td>
<td>Cable Supports</td>
</tr>
<tr>
<td>(I)</td>
<td>Nonmetallic Box Without Cable Clamps</td>
</tr>
<tr>
<td>(J)</td>
<td>Physical Damage</td>
</tr>
<tr>
<td>(K)</td>
<td>Receptacle Faceplates</td>
</tr>
<tr>
<td>(L)</td>
<td>Metal Faceplates Grounded</td>
</tr>
<tr>
<td>(M)</td>
<td>Moisture or Physical Damage</td>
</tr>
<tr>
<td>(N)</td>
<td>Component Interconnections</td>
</tr>
<tr>
<td>(O)</td>
<td>Method of Connecting Expandable Units</td>
</tr>
<tr>
<td>(P)</td>
<td>Prewiring for Air-Conditioning Installation</td>
</tr>
<tr>
<td>(Q)</td>
<td>Prewiring for Other Circuits</td>
</tr>
<tr>
<td>552.49</td>
<td>Maximum Number of Conductors in Boxes</td>
</tr>
<tr>
<td>552.50</td>
<td>Grounded Conductors</td>
</tr>
<tr>
<td>552.51</td>
<td>Connection of Terminals and Splices</td>
</tr>
<tr>
<td>552.52</td>
<td>Switches</td>
</tr>
<tr>
<td>(A)</td>
<td>Lighting Circuits</td>
</tr>
<tr>
<td>(B)</td>
<td>Motors or Other Loads</td>
</tr>
<tr>
<td>(C)</td>
<td>Receptacles</td>
</tr>
<tr>
<td>552.53</td>
<td>Luminaires</td>
</tr>
<tr>
<td>(A)</td>
<td>General</td>
</tr>
</tbody>
</table>
(B) Shower Luminaires

(C) Outdoor Outlets, Luminaires, Air-Cooling Equipment, and So On

552.55 Grounding

(A) Power-Supply Grounding

(B) Panelboard

(C) Insulated Grounded Conductor

552.56 Interior Equipment Grounding

(A) Exposed Metal Parts

(B) Equipment Grounding Conductors

(C) Grounding of Electrical Equipment

(D) Grounding Connection in Nonmetallic Box

(E) Grounding Continuity

(F) Cord-Connected Appliances

552.57 Bonding of Non–Current-Carrying Metal Parts

(A) Required Bonding

(B) Bonding Chassis

(C) Bonding Conductor Requirements

(D) Metallic Roof and Exterior Bonding

(E) Gas, Water, and Waste Pipe Bonding

(F) Furnace and Metal Air Duct Bonding

552.58 Appliance Accessibility and Fastening

552.59 Outdoor Outlets, Fixtures, Including Luminaires, Air-Cooling Equipment, and So On

(A) Listed for Outdoor Use

(B) Outside Heating Equipment, Air-Conditioning Equipment, or Both

Part V. Factory Tests

552.60 Factory Tests (Electrical)

(A) Circuits of 120 Volts or 120/240 Volts

(B) Low-Voltage Circuits

Article 553 Floating Buildings

Part I. General
<table>
<thead>
<tr>
<th>Article 555</th>
<th>555.11 Circuit Breakers, Switches, Panelboards, and Marine Power Outlets</th>
<th>(B) 90 Days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>555.12 Load Calculations for Service and Feeder Conductors</td>
<td>(C) Emergencies and Tests</td>
</tr>
<tr>
<td></td>
<td>555.13 Wiring Methods and Installation</td>
<td>(D) Removal</td>
</tr>
<tr>
<td></td>
<td>(A) Wiring Methods</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(B) Installation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>555.15 Grounding</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(A) Equipment to Be Grounded</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(B) Type of Equipment Grounding Conductor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(C) Size of Equipment Grounding Conductor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(D) Branch-Circuit Equipment Grounding Conductor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(E) Feeder Equipment Grounding Conductors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>555.17 Disconnecting Means for Shore Power Connection(s)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(A) Type</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(B) Location</td>
<td></td>
</tr>
<tr>
<td></td>
<td>555.19 Receptacles</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(A) Shore Power Receptacles</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(B) Other Than Shore Power</td>
<td></td>
</tr>
<tr>
<td></td>
<td>555.21 Motor Fuel Dispensing Stations — Hazardous (Classified) Locations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>555.22 Repair Facilities — Hazardous (Classified) Locations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>555.23 Marine Hoists, Railways, Cranes, and Monorails</td>
<td></td>
</tr>
<tr>
<td></td>
<td>555.24 Signage</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Article 590 Temporary Installations</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>590.1 Scope</td>
<td></td>
</tr>
<tr>
<td></td>
<td>590.2 All Wiring Installations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(A) Other Articles</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(B) Approval</td>
<td></td>
</tr>
<tr>
<td></td>
<td>590.3 Time Constraints</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(A) During the Period of Construction</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Article 600 Electric Signs and Outline Lighting</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Part I. General</td>
<td></td>
</tr>
<tr>
<td></td>
<td>600.1 Scope</td>
<td></td>
</tr>
<tr>
<td></td>
<td>600.2 Definitions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>600.3 Listing</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Article 600 Electric Signs and Outline Lighting</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Part I. General</td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>Subsections</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>600.5</td>
<td>Branch Circuits</td>
<td></td>
</tr>
<tr>
<td>(A)</td>
<td>Required Branch Circuit</td>
<td></td>
</tr>
<tr>
<td>(B)</td>
<td>Rating</td>
<td></td>
</tr>
<tr>
<td>(C)</td>
<td>Wiring Methods</td>
<td></td>
</tr>
<tr>
<td>600.6</td>
<td>Disconnects</td>
<td></td>
</tr>
<tr>
<td>(A)</td>
<td>Location</td>
<td></td>
</tr>
<tr>
<td>(B)</td>
<td>Control Switch Rating</td>
<td></td>
</tr>
<tr>
<td>600.7</td>
<td>Grounding and Bonding</td>
<td></td>
</tr>
<tr>
<td>(A)</td>
<td>Grounding</td>
<td></td>
</tr>
<tr>
<td>(B)</td>
<td>Bonding</td>
<td></td>
</tr>
<tr>
<td>600.8</td>
<td>Enclosures</td>
<td></td>
</tr>
<tr>
<td>(A)</td>
<td>Strength</td>
<td></td>
</tr>
<tr>
<td>(B)</td>
<td>Material</td>
<td></td>
</tr>
<tr>
<td>(C)</td>
<td>Minimum Thickness of Enclosure Metal</td>
<td></td>
</tr>
<tr>
<td>(D)</td>
<td>Protection of Metal</td>
<td></td>
</tr>
<tr>
<td>600.9</td>
<td>Location</td>
<td></td>
</tr>
<tr>
<td>(A)</td>
<td>Vehicles</td>
<td></td>
</tr>
<tr>
<td>(B)</td>
<td>Pedestrians</td>
<td></td>
</tr>
<tr>
<td>(C)</td>
<td>Adjacent to Combustible Materials</td>
<td></td>
</tr>
<tr>
<td>(D)</td>
<td>Wet Location</td>
<td></td>
</tr>
<tr>
<td>600.10</td>
<td>Portable or Mobile Signs</td>
<td></td>
</tr>
<tr>
<td>(A)</td>
<td>Support</td>
<td></td>
</tr>
<tr>
<td>(B)</td>
<td>Attachment Plug</td>
<td></td>
</tr>
<tr>
<td>(C)</td>
<td>Wet or Damp Location</td>
<td></td>
</tr>
<tr>
<td>(D)</td>
<td>Dry Location</td>
<td></td>
</tr>
<tr>
<td>600.12</td>
<td>Field-Installed Secondary Wiring</td>
<td></td>
</tr>
<tr>
<td>(A)</td>
<td>1000 Volts or Less</td>
<td></td>
</tr>
<tr>
<td>(B)</td>
<td>Over 1000 Volts</td>
<td></td>
</tr>
<tr>
<td>(C)</td>
<td>Class 2</td>
<td></td>
</tr>
<tr>
<td>600.21</td>
<td>Ballasts, Transformers, Electronic Power Supplies, and Class 2 Power Sources</td>
<td></td>
</tr>
<tr>
<td>(A)</td>
<td>Accessibility</td>
<td></td>
</tr>
<tr>
<td>(B)</td>
<td>Location</td>
<td></td>
</tr>
<tr>
<td>(C)</td>
<td>Wet Location</td>
<td></td>
</tr>
<tr>
<td>(D)</td>
<td>Working Space</td>
<td></td>
</tr>
<tr>
<td>(E)</td>
<td>Attic and Soffit Locations</td>
<td></td>
</tr>
<tr>
<td>(F)</td>
<td>Suspended Ceilings</td>
<td></td>
</tr>
<tr>
<td>600.22</td>
<td>600.22 Ballasts</td>
<td></td>
</tr>
<tr>
<td>(A)</td>
<td>Type</td>
<td></td>
</tr>
<tr>
<td>(B)</td>
<td>Thermal Protection</td>
<td></td>
</tr>
<tr>
<td>600.23</td>
<td>Transformers and Electronic Power Supplies</td>
<td></td>
</tr>
<tr>
<td>(A)</td>
<td>Type</td>
<td></td>
</tr>
<tr>
<td>(B)</td>
<td>Secondary-Circuit Ground-Fault Protection</td>
<td></td>
</tr>
<tr>
<td>600.24</td>
<td>600.24 Class 2 Power Sources</td>
<td></td>
</tr>
<tr>
<td>(A)</td>
<td>Listing</td>
<td></td>
</tr>
<tr>
<td>(B)</td>
<td>Grounding</td>
<td></td>
</tr>
<tr>
<td>(C)</td>
<td>Wiring Methods on the Supply Side of the Class 2 Power Supply</td>
<td></td>
</tr>
<tr>
<td>(D)</td>
<td>Secondary Wiring</td>
<td></td>
</tr>
<tr>
<td>Part II</td>
<td>Field-Installed Skeleton Tubing, Outline</td>
<td></td>
</tr>
<tr>
<td>Lighting</td>
<td>Lighting, and Secondary Wiring</td>
<td></td>
</tr>
<tr>
<td>600.30</td>
<td>Applicability</td>
<td></td>
</tr>
<tr>
<td>600.31</td>
<td>Neon Secondary-Circuit Wiring, 1000 Volts or Less, Nominal</td>
<td></td>
</tr>
<tr>
<td>(A)</td>
<td>Wiring Method</td>
<td></td>
</tr>
<tr>
<td>(B)</td>
<td>Insulation and Size</td>
<td></td>
</tr>
<tr>
<td>(C)</td>
<td>Number of Conductors in Raceway</td>
<td></td>
</tr>
<tr>
<td>(D)</td>
<td>Installation</td>
<td></td>
</tr>
<tr>
<td>(E)</td>
<td>Protection of Leads</td>
<td></td>
</tr>
<tr>
<td>600.32</td>
<td>Neon Secondary-Circuit Wiring, over 1000 Volts, Nominal</td>
<td></td>
</tr>
</tbody>
</table>
### 2017 NEC Table of Contents

- **Article 610 Cranes and Hoists**
  - Part I. General
    - 610.1 Scope
    - 610.2 Definition
    - 610.3 Special Requirements for Particular Locations
      - (A) Hazardous (Classified) Locations
      - (B) Combustible Materials
      - (C) Electrolytic Cell Lines
  - Part II. Wiring
    - 610.11 Wiring Method
      - (A) Contact Conductor
      - (B) Exposed Conductors
      - (C) Flexible Connections to Motors and Similar Equipment
      - (D) Pushbutton Station Multiconductor Cable
      - (E) Flexibility to Moving Parts
    - 610.12 Raceway or Cable Terminal Fittings
      - (A) Separately Bushed Hole
      - (B) Bushing in Lieu of a Box
    - 610.13 Types of Conductors
      - (A) Exposed to External Heat or Connected to Resistors
      - (B) Contact Conductors
      - (C) Flexibility
      - (D) Class 1, Class 2, and Class 3 Circuits
    - 610.14 Rating and Size of Conductors
      - (A) Ampacity
      - (B) Secondary Resistor Conductors
      - (C) Minimum Size
  - Part III. Contact Conductors
    - 610.21 Installation of Contact Conductors
      - (A) Locating or Guarding Contact Conductors
      - (B) Contact Wires
      - (C) Supports Along Runways
      - (D) Supports on Bridges
      - (E) Supports for Rigid Conductors
      - (F) Track as Circuit Conductor
      - (G) Electrical Continuity of Contact Conductors
      - (H) Not to Supply Other Equipment
    - 610.22 Collectors
  - Part IV. Disconnecting Means
    - 610.31 Runway Conductor Disconnecting Means
    - 610.32 Disconnecting Means for Cranes and Monorail Hoists
    - 610.33 Rating of Disconnecting Means
  - Part V. Overcurrent Protection
    - 610.41 Feeders, Runway Conductors
      - (A) Single Feeder
      - (B) More Than One Feeder Circuit
    - 610.42 Branch-Circuit Short-Circuit and Ground-Fault Protection
      - (A) Fuse or Circuit Breaker Rating
      - (B) Taps
    - 610.43 Overload Protection
      - (A) Motor and Branch-Circuit Overload Protection
      - (B) Manually Controlled Motor
<table>
<thead>
<tr>
<th>620.51 Separate Controllers (A) Motions with More Than One Motor</th>
<th>620.16 Short-Circuit Current Rating (A) Marking</th>
</tr>
</thead>
<tbody>
<tr>
<td>620.53 Overcurrent Protection (B) Multiple Motion Controller</td>
<td>620.15 Motor Controller Rating (B) Installation</td>
</tr>
<tr>
<td>(A) Taps to Control Transformers (B) Continuity of Power</td>
<td>Part III. Wiring 620.21 Wiring Methods (B) Escalators</td>
</tr>
<tr>
<td>610.57 Clearance (B) Traveling Cables</td>
<td>620.22 Branch Circuits for Car Lighting, Receptacle(s), Ventilation, Heating, and Air-Conditioning (B) Air-Conditioning and Heating Source</td>
</tr>
<tr>
<td>Part VII. Grounding 610.61 Grounding</td>
<td>620.23 Branch Circuits for Machine Room or Control Room/Machinery Space or Control Space Lighting and Receptacle(s) (D) Low Voltage</td>
</tr>
<tr>
<td>Article 620 Elevators, Dumbwaiters, Escalators, Moving Walks, Platform Lifts, and Stairway Chairlifts</td>
<td>620.24 Branch Circuit for Hoistway Pit Lighting</td>
</tr>
<tr>
<td>Part I. General 620.1 Scope</td>
<td>620.11 Insulation of Conductors (A) Separate Branch Circuits</td>
</tr>
<tr>
<td>620.2 Definitions</td>
<td>(B) Traveling Cables</td>
</tr>
<tr>
<td>620.3 Voltage Limitations (B) Other Wiring</td>
<td>620.13 Feeder and Branch-Circuit Conductors (B) Conductors Supplying a Single Motor Controller</td>
</tr>
<tr>
<td>(A) Power Circuits (A) Conductors Supplying Single Motor</td>
<td></td>
</tr>
<tr>
<td>(B) Lighting Circuits (B) Conductors Supplying a Single Motor Transformer</td>
<td></td>
</tr>
<tr>
<td>(C) Heating and Air-Conditioning Circuits (C) Conductors Supplying a Single Power Transformer</td>
<td></td>
</tr>
<tr>
<td>620.4 Live Parts Enclosed (D) Conductors Supplying More Than One Motor, Motor Controller, or Power Transformer</td>
<td></td>
</tr>
<tr>
<td>620.5 Working Clearances (A) Elevators</td>
<td></td>
</tr>
<tr>
<td>(A) Flexible Connections to Equipment (B) Escalators</td>
<td></td>
</tr>
<tr>
<td>(B) Guards (C) Platform Lifts and Stairway Chairlift Raceways</td>
<td></td>
</tr>
<tr>
<td>(C) Examination, Adjusting, and Servicing</td>
<td>620.25 Branch Circuits for Elevator Machine Room or Machine Room Raceway</td>
</tr>
<tr>
<td>(D) Low Voltage</td>
<td>620.26 Branch Circuits for Machine Room or Machine Room Raceway and Control Raceway</td>
</tr>
<tr>
<td>Part II. Conductors 620.11 Insulation of Conductors</td>
<td>620.27 Branch Circuits for Machine Room or Machine Room Raceway and Control Raceway for Machine Room or Machine Room Raceway</td>
</tr>
<tr>
<td>(A) Hoistway Door Interlock Wiring (A) Separate Branch Circuits</td>
<td></td>
</tr>
<tr>
<td>(B) Traveling Cables (B) Lighting Switch</td>
<td></td>
</tr>
<tr>
<td>(C) Other Wiring (C) Duplex Receptacle</td>
<td></td>
</tr>
<tr>
<td>(D) Insulation 620.28 Branch Circuits for Elevator Machine Room Raceway and Control Raceway for Machine Room or Machine Room Raceway</td>
<td></td>
</tr>
</tbody>
</table>
and Receptacles
(A) Separate Branch Circuits
(B) Lighting Switch
(C) Duplex Receptacle
620.25 Branch Circuits for Other Utilization Equipment
(A) Additional Branch Circuits
(B) Overcurrent Devices
Part IV. Installation of Conductors
620.32 Metal Wireways and Nonmetallic Wireways
620.33 Number of Conductors in Raceways
620.34 Supports
620.35 Auxiliary Gutters
620.36 Different Systems in One Raceway or Traveling Cable
620.37 Wiring in Hoistways, Machine Rooms, Control Rooms, Machinery Spaces, and Control Spaces
(A) Uses Permitted
(B) Lightning Protection
(C) Main Feeders
620.38 Electrical Equipment in Garages and Similar Occupancies
Part V. Traveling Cables
620.41 Suspension of Traveling Cables
620.42 Hazardous (Classified) Locations
620.43 Location of and Protection for Cables
620.44 Installation of Traveling Cables
Part VI. Disconnecting Means and Control
620.51 Disconnecting Means
(A) Type
(B) Operation
(C) Location
(D) Identification and Signs
(E) Surge Protection
620.52 Power from More Than One Source
(A) Single-Car and Multicar Installations
(B) Warning Sign for Multiple Disconnecting Means
(C) Interconnection Multicar Controllers
620.53 Car Light, Receptacle(s), and Ventilation Disconnecting Means
620.54 Heating and Air-Conditioning Disconnecting Means
620.55 Utilization Equipment Disconnecting Means
Part VII. Overcurrent Protection
620.61 Overcurrent Protection
(A) Operating Devices and Control and Signaling Circuits
(B) Overload Protection for Motors
(C) Motor Feeder Short-Circuit and Ground-Fault Protection
(D) Motor Branch-Circuit Short-Circuit and Ground-Fault Protection
620.62 Selective Coordination
Part VIII. Machine Rooms, Control Rooms, Machinery Spaces, and Control Spaces
620.71 Guarding Equipment
(A) Motor Controllers
(B) Driving Machines
Part IX. Grounding
620.81 Metal Raceways Attached to Cars
620.82 Electric Elevators
620.83 Nonelectric Elevators
620.84 Escalators, Moving Walks, Platform Lifts, and Stairway Chairlifts
620.85 Ground-Fault Circuit-Interrupter Protection for Personnel
Part X. Emergency and Standby Power Systems
## Article 625 Electric Vehicle Charging System

### Part I. General
- 625.1 Scope
- 625.2 Definitions
- 625.4 Voltages
- 625.5 Listed

### Part II. Equipment Construction
- 625.10 Electric Vehicle Coupler
  - (A) Construction and Installation
  - (B) Unintentional Disconnection
  - (C) Grounding Pole
  - (D) Grounding Pole Requirements
- 625.15 Markings
  - (A) General
  - (B) Ventilation Not Required
  - (C) Ventilation Required

### Part III. Installation
- 625.40 Electric Vehicle Branch Circuit
- 625.41 Overcurrent Protection
- 625.42 Rating
- 625.43 Disconnecting Means
- 625.44 Equipment Connection

## Article 626 Electrified Truck Parking Spaces

### Part I. General
- 626.1 Scope
- 626.2 Definitions
- 626.3 Other Articles

### Part II. Electrified Truck Parking Space Electrical Wiring Systems
- 626.10 Branch Circuits

### Part III. Installation
- 626.101 Grounding
- 626.102 Construction
- 626.103 Construction and Installation
- 626.104 Unintentional Disconnection
- 626.105 Grounding Pole
- 626.106 Grounding Pole Requirements
- 626.107 Markings
- 626.108 Means of Coupling
- 626.109 Cords and Cables
- 626.110 Power-Supply Cord
- 626.111 Output Cable
- 626.112 Overall Cord and Cable Length
- 626.113 Interlock
- 626.114 Automatic De-Energization of Cable
- 626.115 Personnel Protection System

### Part IV. Wireless Power Transfer Equipment
- 626.101 Grounding
- 626.102 Construction
- 626.103 Type
- 626.104 Installation
- 626.105 Primary Pad
- 626.106 Protection of the Output Cable
- 626.107 Other Wiring Systems

### Article 626 Electrified Truck Parking Spaces

### Part I. General
- 626.1 Scope
- 626.2 Definitions
- 626.3 Other Articles
2017 NEC TABLE OF CONTENTS

626.11 Feeder and Service Load Calculations
   (A) Parking Space Load
   (B) Demand Factors
   (C) Two or More Electrified Truck Parking Spaces
   (D) Conductor Rating

Part III. Electrified Truck Parking Space Supply Equipment

626.22 Wiring Methods and Materials
   (A) Electrified Truck Parking Space Supply Equipment Type
   (B) Mounting Height
   (C) Access to Working Space
   (D) Disconnecting Means

626.23 Overhead Gantry or Cable Management System
   (A) Cable Management
   (B) Strain Relief

626.24 Electrified Truck Parking Space Supply Equipment Connection Means
   (A) General
   (B) Receptacle
   (C) Disconnecting Means, Parking Space
   (D) Ground-Fault Circuit-Interrupter Protection for Personnel

626.25 Separable Power-Supply Cable Assembly
   (A) Rating(s)
   (B) Power-Supply Cord

626.26 Loss of Primary Power

626.27 Interactive Systems

Part IV. Transport Refrigerated Units (TRUs)

626.30 Transport Refrigerated Units
   (A) Branch Circuits
   (B) Electrified Truck Parking Space Supply Equipment

626.31 Disconnecting Means and Receptacles
   (A) Disconnecting Means

626.32 Separable Power Supply Cable Assembly
   (A) Rating(s)
   (B) Cord Assemblies

   (C) Attachment Plug(s) and Cord Connector(s)

Article 630 Electric Welders

Part I. General

630.1 Scope

630.6 Listing

Part II. Arc Welders

630.11 Ampacity of Supply Conductors
   (A) Individual Welders
   (B) Group of Welders

630.12 Overcurrent Protection

630.13 Disconnecting Means

630.14 Marking

630.15 Grounding of Welder Secondary Circuit

Part III. Resistance Welders

630.31 Ampacity of Supply Conductors
   (A) Individual Welders
   (B) Groups of Welders

630.32 Overcurrent Protection

630.33 Disconnecting Means

630.34 Marking

Part IV. Welding Cable

630.41 Conductors

630.42 Installation

630.43 Marking

(A) Cable Support
(B) Spread of Fire and Products of Combustion

(C) Signs

Article 640 Audio Signal Processing, Amplification, and Reproduction Equipment

Part I. General

640.1 Scope

(A) Covered

(B) Not Covered

640.2 Definitions

640.3 Locations and Other Articles

(A) Spread of Fire or Products of Combustion

(B) Ducts, Plenums, and Other Air-Handling Spaces

(C) Cable Trays

(D) Hazardous (Classified) Locations

(E) Assembly Occupancies

(F) Theaters, Audience Areas of Motion Picture and Television Studios, and Similar Locations

(G) Carnivals, Circuses, Fairs, and Similar Events

(H) Motion Picture and Television Studios

(I) Swimming Pools, Fountains, and Similar Locations

(J) Combination Systems

(K) Antennas

(L) Generators

(M) Organ Pipes

640.4 Protection of Electrical Equipment

640.5 Access to Electrical Equipment Behind Panels Designed to Allow Access

640.6 Mechanical Execution of Work

(A) Installation of Audio Distribution Cables

(B) Abandoned Audio Distribution Cables

(C) Installed Audio Distribution Cable Identified for Future Use

640.7 Grounding

(A) General

(B) Separately Derived Systems with 60 Volts to Ground

(C) Isolated Ground Receptacles

640.8 Grouping of Conductors

640.9 Wiring Methods

(A) Wiring to and Between Audio Equipment

(B) Auxiliary Power Supply Wiring

(C) Output Wiring and Listing of Amplifiers

(D) Use of Audio Transformers and Autotransformers

640.10 Audio Systems Near Bodies of Water

(A) Equipment Supplied by Branch-Circuit Power

(B) Equipment Not Supplied by Branch-Circuit Power

Part II. Permanent Audio System Installations

640.21 Use of Flexible Cords and Cables

(A) Between Equipment and Branch-Circuit Power

(B) Between Loudspeakers and Amplifiers or Between Loudspeakers

(C) Between Equipment

(D) Between Equipment and Power Supplies Other Than Branch-Circuit Power

(E) Between Equipment Racks and Premises Wiring System

640.22 Wiring of Equipment Racks and Enclosures

640.23 Conduit or Tubing

(A) Number of Conductors

(B) Nonmetallic Conduit or Tubing and Insulating Bushings
640.24 Wireways, Gutters, and Auxiliary Gutters

Partitions, Walls, and Ceilings

Part III. Portable and Temporary Audio System Installations

640.41 Multipole Branch-Circuit Cable Connectors

640.42 Use of Flexible Cords and Cables

(A) Between Equipment and Branch-Circuit Power

(B) Between Loudspeakers and Amplifiers, or Between Loudspeakers

(C) Between Equipment and/or Between Equipment Racks

(D) Between Equipment Racks and Branch-Circuit Power

640.43 Wiring of Equipment Racks

640.44 Environmental Protection of Equipment

640.45 Protection of Wiring

640.46 Equipment Access

Article 645 Information Technology Equipment

645.1 Scope

645.2 Definitions

645.3 Other Articles

(A) Spread of Fire or Products of Combustion

(B) Wiring and Cabling in Other Spaces Used for Environmental Air (Plenums)

(C) Bonding and Grounding

(D) Electrical Classification of Data Circuits

(E) Fire Alarm Cables and Equipment

(F) Cable Routing Assemblies, Communications

Wires, Cables, Raceways, and Equipment

(G) Community Antenna Television and Radio Distribution Systems Cables and Equipment

(H) Optical Fiber Cables

(I) Cables Not in Information Technology Equipment Room

645.4 Special Requirements for Information Technology Equipment Room

645.5 Supply Circuits and Interconnecting Cables

645.10 Disconnecting Means

(A) Remote Disconnect Controls

(B) Critical Operations Data Systems

645.11 Uninterruptible Power Supplies (UPSs)

645.14 System Grounding

645.15 Equipment Grounding and Bonding

645.16 Marking

645.17 Power Distribution Units

645.18 Surge Protection for Critical Operations Data Systems

645.25 Engineering Supervision

645.27 Selective Coordination

Article 646 Modular Data Centers

Part I. General

646.1 Scope

646.2 Definitions

646.3 Other Articles

(A) Spread of Fire or Products of Combustion
2017 NEC TABLE OF CONTENTS

(B) Wiring and Cabling in Other Spaces Used for Environmental Air (Plenums)

(C) Grounding

(D) Electrical Classification of Data Circuits

(E) Fire Alarm Equipment

(F) Cable Routing Assemblies and Communications Wires, Cables, Raceways, and Equipment

(G) Community Antenna Television and Radio Distribution Systems Cables and Equipment

(H) Storage Batteries

(I) Surge-Protective Devices (SPDs)

(J) Lighting

(K) Power Distribution Wiring and Wiring Protection

(L) Wiring Methods and Materials

(M) Service Equipment

(N) Disconnecting Means

646.4 Applicable Requirements

646.5 Nameplate Data

646.6 Supply Conductors and Overcurrent Protection (A) Size

(B) Overcurrent Protection

646.7 Short-Circuit Current Rating (A) Service Equipment

(B) MDCs Connected to Branch Circuits and Feeders

(C) MDCs Powered from Separate MDC System Enclosures

646.8 Field-Wiring Compartments

646.9 Flexible Power Cords and Cables for Connecting Equipment Enclosures of an MDC System (A) Uses Permitted

646.10 Electrical Supply and Distribution

646.11 Distribution Transformers

(A) Utility-Owned Transformers

(B) Non-Utility-Owned Premises Transformers

(C) Power Transformers

646.12 Receptacles

646.13 Other Electrical Equipment

646.14 Installation and Use

Part III. Lighting

646.15 General Illumination

646.16 Emergency Lighting

646.17 Emergency Lighting Circuits

Part IV. Workspace

646.18 General

646.19 Entrance to and Egress from Working Space (A) Unobstructed Egress

(B) Extra Working Space

646.20 Working Space for ITE (A) Low-Voltage Circuits

(B) Other Circuits

646.21 Work Areas and Working Space About Batteries

646.22 Workspace for Routine Service and Maintenance

Article 647 Sensitive Electronic Equipment

647.1 Scope

647.3 General

647.4 Wiring Methods

(A) Panelboards and Overcurrent Protection

(B) Junction Boxes
<table>
<thead>
<tr>
<th>Article 650 Pipe Organs</th>
<th>660.2 Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>650.1 Scope</td>
<td>660.3 Hazardous (Classified) Locations</td>
</tr>
<tr>
<td>650.2 Definitions</td>
<td>660.4 Connection to Supply Circuit</td>
</tr>
<tr>
<td>650.3 Other Articles</td>
<td>(A) Fixed and Stationary Equipment</td>
</tr>
<tr>
<td>(A) Electronic Organ Equipment</td>
<td>(B) Portable, Mobile, and Transportable Equipment</td>
</tr>
<tr>
<td>(B) Optical Fiber Cable</td>
<td></td>
</tr>
<tr>
<td>650.4 Source of Energy</td>
<td></td>
</tr>
<tr>
<td>650.5 Grounding or Double Insulation of the DC Power Supply</td>
<td></td>
</tr>
<tr>
<td>650.6 Conductors</td>
<td></td>
</tr>
<tr>
<td>(A) Size</td>
<td></td>
</tr>
<tr>
<td>(B) Insulation</td>
<td></td>
</tr>
<tr>
<td>(C) Conductors to Be Cabled</td>
<td></td>
</tr>
<tr>
<td>(D) Cable Covering</td>
<td></td>
</tr>
<tr>
<td>650.7 Installation of Conductors</td>
<td></td>
</tr>
<tr>
<td>650.8 Overcurrent Protection</td>
<td></td>
</tr>
<tr>
<td>650.9 Protection from Accidental Contact</td>
<td></td>
</tr>
<tr>
<td>Article 660 X-Ray Equipment</td>
<td></td>
</tr>
<tr>
<td>Part I. General</td>
<td></td>
</tr>
<tr>
<td>660.1 Scope</td>
<td></td>
</tr>
<tr>
<td>660.2 Definitions</td>
<td></td>
</tr>
<tr>
<td>660.3 Hazardous (Classified) Locations</td>
<td></td>
</tr>
<tr>
<td>660.4 Connection to Supply Circuit</td>
<td></td>
</tr>
<tr>
<td>(A) Fixed and Stationary Equipment</td>
<td></td>
</tr>
<tr>
<td>(B) Portable, Mobile, and Transportable Equipment</td>
<td></td>
</tr>
<tr>
<td>660.5 Disconnecting Means</td>
<td></td>
</tr>
<tr>
<td>660.6 Rating of Supply Conductors and Overcurrent Protection</td>
<td></td>
</tr>
<tr>
<td>(A) Branch-Circuit Conductors</td>
<td></td>
</tr>
<tr>
<td>(B) Feeder Conductors</td>
<td></td>
</tr>
<tr>
<td>660.7 Wiring Terminals</td>
<td></td>
</tr>
<tr>
<td>660.9 Minimum Size of Conductors</td>
<td></td>
</tr>
<tr>
<td>660.10 Equipment Installations</td>
<td></td>
</tr>
<tr>
<td>Part II. Control</td>
<td></td>
</tr>
<tr>
<td>660.20 Fixed and Stationary Equipment</td>
<td></td>
</tr>
<tr>
<td>(A) Separate Control Device</td>
<td></td>
</tr>
<tr>
<td>(B) Protective Device</td>
<td></td>
</tr>
<tr>
<td>660.21 Portable and Mobile Equipment</td>
<td></td>
</tr>
<tr>
<td>660.23 Industrial and Commercial Laboratory Equipment</td>
<td></td>
</tr>
<tr>
<td>(A) Radiographic and Fluoroscopic Types</td>
<td></td>
</tr>
<tr>
<td>(B) Diffraction and Irradiation Types</td>
<td></td>
</tr>
<tr>
<td>660.24 Independent Control</td>
<td></td>
</tr>
<tr>
<td>Part III. Transformers and Capacitors</td>
<td></td>
</tr>
<tr>
<td>660.35 General</td>
<td></td>
</tr>
<tr>
<td>660.36 Capacitors</td>
<td></td>
</tr>
<tr>
<td>Part IV. Guarding and Grounding</td>
<td></td>
</tr>
<tr>
<td>660.47 General</td>
<td></td>
</tr>
<tr>
<td>(A) High-Voltage Parts</td>
<td></td>
</tr>
<tr>
<td>(B) Low-Voltage Cables</td>
<td></td>
</tr>
<tr>
<td>660.48 Grounding</td>
<td></td>
</tr>
<tr>
<td>Article 665 Induction and Dielectric Heating</td>
<td></td>
</tr>
</tbody>
</table>
2017 NEC TABLE OF CONTENTS

Equipment

Part I. General
665.1 Scope
665.2 Definitions
665.4 Hazardous (Classified) Locations
665.5 Output Circuit
665.7 Remote Control
(A) Multiple Control Points
(B) Foot Switches
665.10 Ampacity of Supply Conductors
(A) Nameplate Rating
(B) Motor-Generator Equipment
665.11 Overcurrent Protection
665.12 Disconnecting Means

Part II. Guarding, Grounding, and Labeling
665.19 Component Interconnection
665.20 Enclosures
665.21 Control Panels
665.22 Access to Internal Equipment
665.23 Warning Labels or Signs
665.24 Capacitors
665.25 Dielectric Heating Applicator Shielding
665.26 Grounding and Bonding
665.27 Marking

Article 668 Electrolytic Cells
668.1 Scope
668.2 Definitions
668.3 Other Articles
(A) Lighting, Ventilating, Material Handling
(B) Systems Not Electrically Connected
(C) Electrolytic Cell Lines
668.10 Cell Line Working Zone
(A) Area Covered
(B) Area Not Covered

668.11 Direct-Current Cell Line Process Power Supply
(A) Not Grounded
(B) Metal Enclosures Grounded
(C) Grounding Requirements

668.12 Cell Line Conductors
(A) Insulation and Material
(B) Size

668.13 Disconnecting Means
(A) More Than One Process Power Supply
(B) Removable Links or Conductors

668.14 Shunting Means
(A) Partial or Total Shunting
(B) Shunting One or More Cells

668.15 Grounding

668.20 Portable Electrical Equipment
(A) Portable Electrical Equipment Not to Be Grounded
(B) Isolating Transformers
(C) Marking

668.21 Power-Supply Circuits and Receptacles for Portable Electrical Equipment
(A) Isolated Circuits
(B) Noninterchangeability
(C) Marking

668.30 Fixed and Portable Electrical Equipment
(A) Electrical Equipment Not Required to Be Grounded
(B) Exposed Conductive Surfaces Not Required to Be Grounded
(C) Wiring Methods
(D) Circuit Protection
(E) Bonding

668.31 Auxiliary Nonelectrical Connections
668.32 Cranes and Hoists

(A) Conductive Surfaces to Be Insulated
from Ground
(B) Hazardous Electrical Conditions
668.40 Enclosures

Article 669 Electroplating

669.1 Scope
669.3 General
669.5 Branch-Circuit Conductors
669.6 Wiring Methods
(A) Systems Not Exceeding 60 Volts Direct
Current
(B) Systems Exceeding 60 Volts Direct
Current
669.7 Warning Signs
669.8 Disconnecting Means
(A) More Than One Power Supply
(B) Removable Links or Conductors
669.9 Overcurrent Protection

Article 670 Industrial Machinery

670.1 Scope
670.2 Definition
670.3 Machine Nameplate Data
(A) Permanent Nameplate
(B) Overcurrent Protection
670.4 Supply Conductors and Overcurrent Protection
(A) Size
(B) Disconnecting Means
(C) Overcurrent Protection
670.5 Short-Circuit Current Rating
670.6 Surge Protection

Article 675 Electrically Driven or Controlled
Irrigation Machines

Part I. General
675.1 Scope
675.2 Definitions
675.4 Irrigation Cable
(A) Construction
(B) Alternate Wiring Methods
(C) Supports
(D) Fittings
675.5 More Than Three Conductors in a Raceway or Cable
675.6 Marking on Main Control Panel
675.7 Equivalent Current Ratings
(A) Continuous-Current Rating
(B) Locked-Rotor Current
675.8 Disconnecting Means
(A) Main Controller
(B) Main Disconnecting Means
(C) Disconnecting Means for Individual Motors
and Controllers
675.9 Branch-Circuit Conductors
675.10 Several Motors on One Branch Circuit
(A) Protection Required
(B) Individual Protection Not Required
675.11 Collector Rings
(A) Transmitting Current for Power Purposes
(B) Control and Signal Purposes
(C) Grounding
(D) Protection
675.12 Grounding
675.13 Methods of Grounding
675.14 Bonding
675.15 Lightning Protection
<table>
<thead>
<tr>
<th>675.16 Energy from More Than One Source</th>
<th>680.20 General</th>
</tr>
</thead>
<tbody>
<tr>
<td>675.17 Connectors</td>
<td>680.21 Motors</td>
</tr>
<tr>
<td>Part II. Center Pivot Irrigation Machines</td>
<td>(A) Wiring Methods</td>
</tr>
<tr>
<td>675.21 General</td>
<td>(B) Double Insulated Pool Pumps</td>
</tr>
<tr>
<td>675.22 Equivalent Current Ratings</td>
<td>(C) GFCI Protection</td>
</tr>
<tr>
<td>(A) Continuous-Current Rating</td>
<td>680.22 Lighting, Receptacles, and Equipment</td>
</tr>
<tr>
<td>(B) Locked-Rotor Current</td>
<td>(A) Receptacles</td>
</tr>
<tr>
<td><strong>Article 680 Swimming Pools, Fountains, and Similar Installations</strong></td>
<td>(B) Luminaires, Lighting Outlets, and Ceiling Suspended (Paddle) Fans</td>
</tr>
<tr>
<td><strong>Part I. General</strong></td>
<td>(C) Switching Devices</td>
</tr>
<tr>
<td>680.1 Scope</td>
<td>(D) Other Outlets</td>
</tr>
<tr>
<td>680.2 Definitions</td>
<td>680.23 Underwater Luminaires</td>
</tr>
<tr>
<td>680.4 Approval of Equipment</td>
<td>(A) General</td>
</tr>
<tr>
<td>680.5 Ground-Fault Circuit Interrupters</td>
<td>(B) Wet-Niche Luminaires</td>
</tr>
<tr>
<td>680.6 Grounding</td>
<td>(C) Dry-Niche Luminaires</td>
</tr>
<tr>
<td>680.7 Grounding and Bonding Terminals</td>
<td>(D) No-Niche Luminaires</td>
</tr>
<tr>
<td>680.8 Cord-and-Plug-Connected Equipment</td>
<td>(E) Through-Wall Lighting Assembly</td>
</tr>
<tr>
<td>(A) Length</td>
<td>(F) Branch-Circuit Wiring</td>
</tr>
<tr>
<td>(B) Equipment Grounding</td>
<td>680.24 Junction Boxes and Electrical Enclosures for Transformers or Ground-Fault Circuit Interrupters</td>
</tr>
<tr>
<td>(C) Construction</td>
<td>(A) Junction Boxes</td>
</tr>
<tr>
<td>680.9 Overhead Conductor Clearances</td>
<td>(B) Other Enclosures</td>
</tr>
<tr>
<td>(A) Power</td>
<td>(C) Protection</td>
</tr>
<tr>
<td>(B) Communications Systems</td>
<td>(D) Grounding Terminals</td>
</tr>
<tr>
<td>(C) Network-Powered Broadband Communications</td>
<td>(E) Strain Relief</td>
</tr>
<tr>
<td>Systems</td>
<td>(F) Grounding</td>
</tr>
<tr>
<td>680.10 Electric Pool Water Heaters</td>
<td>680.25 Feeders</td>
</tr>
<tr>
<td>680.11 Underground Wiring Location</td>
<td>(A) Feeders</td>
</tr>
<tr>
<td>680.12 Equipment Rooms and Pits</td>
<td>(B) Aluminum Conduit</td>
</tr>
<tr>
<td>680.13 Maintenance Disconnecting Means</td>
<td>680.26 Equipotential Bonding</td>
</tr>
<tr>
<td>(A) General</td>
<td>(A) Performance</td>
</tr>
<tr>
<td>(B) Wiring Methods</td>
<td>(B) Bonded Parts</td>
</tr>
<tr>
<td><strong>Part II. Permanently Installed Pools</strong></td>
<td></td>
</tr>
</tbody>
</table>
(C) Pool Water

680.27 Specialized Pool Equipment

(A) Underwater Audio Equipment

(B) Electrically Operated Pool Covers

(C) Deck Area Heating

680.28 Gas-Fired Water Heater

Part III. Storable Pools, Storable Spas, and Storable Hot Tubs

680.30 General

680.31 Pumps

680.32 Ground-Fault Circuit Interrupters Required

680.33 Luminaires

(A) Within the Low Voltage Contact Limit

(B) Over the Low Voltage Contact Limit But Not over 150 Volts

680.34 Receptacle Locations

Part IV. Spas and Hot Tubs

680.40 General

680.41 Emergency Switch for Spas and Hot Tubs

680.42 Outdoor Installations

(A) Flexible Connections

(B) Bonding

(C) Interior Wiring to Outdoor Installations

680.43 Indoor Installations

(A) Receptacles

(B) Installation of Luminaires, Lighting Outlets, and Ceiling-Suspended (Paddle) Fans

(C) Switches

(D) Bonding

(E) Methods of Bonding

(F) Grounding

(G) Underwater Audio Equipment

680.44 Protection

(A) Listed Units

(B) Other Units

Part V. Fountains

680.50 General

680.51 Luminaires, Submersible Pumps, and Other Submersible Equipment

(A) Ground-Fault Circuit Interrupter

(B) Operating Voltage

(C) Luminaire Lenses

(D) Overheating Protection

(E) Wiring

(F) Servicing

(G) Stability

680.52 Junction Boxes and Other Enclosures

(A) General

(B) Underwater Junction Boxes and Other Underwater Enclosures

680.53 Bonding

680.54 Grounding

680.55 Methods of Grounding

(A) Applied Provisions

(B) Supplied by a Flexible Cord

680.56 Cord-and-Plug-Connected Equipment

(A) Ground-Fault Circuit Interrupter

(B) Cord Type

(C) Sealing

(D) Terminations

680.57 Signs

(A) General

(B) Ground-Fault Circuit-Interrupter Protection for Personnel

(C) Location

(D) Disconnect
| 690.2 Definitions | Part III. Disconnecting Means
| 690.4 General Requirements | 690.13 Photovoltaic System Disconnecting Means
| (A) Photovoltaic Systems | (A) Location
| (B) Equipment | (B) Marking
| (C) Qualified Personnel | (C) Suitable for Use
| (D) Multiple PV Systems | (D) Maximum Number of Disconnects
| (E) Locations Not Permitted | (E) Ratings
| 690.6 Alternating-Current (ac) Modules | (F) Type of Disconnect
| (A) Photovoltaic Source Circuits | 690.15 Disconnection of Photovoltaic Equipment
| (B) Inverter Output Circuit | (A) Location
| Part II. Circuit Requirements | (B) Interrupting Rating
| 690.7 Maximum Voltage | (C) Isolating Device
| (A) Photovoltaic Source and Output Circuits | (D) Equipment Disconnecting Means
| (B) DC-to-DC Converter Source and Output Circuits | Part IV. Wiring Methods
| Circuits | 690.31 Methods Permitted
| (C) Bipolar Source and Output Circuits | (A) Wiring Systems
| 690.8 Circuit Sizing and Current | (B) Identification and Grouping
| (A) Calculation of Maximum Circuit Current | (C) Single-Conductor Cable
| (B) Conductor Ampacity | (D) Multiconductor Cable
| (C) Systems with Multiple Direct-Current Voltages | (E) Flexible Cords and Cables Connected to Tracking PV Arrays
| (D) Sizing of Module Interconnection Conductors | (F) Small-Conductor Cables
| 690.9 Overcurrent Protection | (G) Photovoltaic System DC Circuits on or in a Building
| (A) Circuits and Equipment | (H) Flexible, Fine-Stranded Cables
| (B) Overcurrent Device Ratings | (I) Bipolar Photovoltaic Systems
| (C) Photovoltaic Source and Output Circuits | 690.32 Component Interconnections
| (D) Power Transformers | 690.33 Connectors
| 690.10 Stand-Alone Systems | 690.12 Rapid Shutdown of PV Systems on Buildings
| 690.11 Arc-Fault Circuit Protection (Direct Current) | (A) Configuration
| 690.12 Rapid Shutdown of PV Systems on Buildings | (B) Guarding
| (A) Controlled Conductors | (C) Type
| (B) Controlled Limits | (D) Grounding Member
| (C) Initiation Device | (E) Interruption of Circuit
| (D) Equipment | 101 | Page
690.34 Access to Boxes

Part V. Grounding and Bonding

690.41 System Grounding

(A) PV System Grounding Configurations

(B) Ground-Fault Protection

690.42 Point of System Grounding Connection

690.43 Equipment Grounding and Bonding

(A) Photovoltaic Module Mounting Systems and Devices

(B) Equipment Secured to Grounded Metal Supports

(C) With Circuit Conductors

690.45 Size of Equipment Grounding Conductors

690.46 Array Equipment Grounding Conductors

690.47 Grounding Electrode System

(A) Buildings or Structures Supporting a PV Array

(B) Additional Auxiliary Electrodes for Array Grounding

690.50 Equipment Bonding Jumpers

Part VI. Marking

690.51 Modules

690.52 Alternating-Current Photovoltaic Modules

690.53 Direct-Current Photovoltaic Power Source

690.54 Interactive System Point of Interconnection

690.55 Photovoltaic Systems Connected to Energy Storage Systems

690.56 Identification of Power Sources

(A) Facilities with Stand-Alone Systems

(B) Facilities with Utility Services and Photovoltaic Systems

(C) Buildings with Rapid Shutdown

Part VII. Connection to Other Sources

690.59 Connection to Other Sources

Part VIII. Energy Storage Systems

690.71 General

690.72 Self-regulated PV Charge Control

Article 691 Large-Scale Photovoltaic (PV) Electric Power Production Facility

691.1 Scope

691.2 Definitions

691.4 Special Requirements for Large-Scale PV Electric Supply Stations

691.5 Equipment Approval

691.6 Engineered Design

691.7 Conformance of Construction to Engineered Design

691.8 Direct Current Operating Voltage

691.9 Disconnection of Photovoltaic Equipment

691.10 Arc-Fault Mitigation

691.11 Fence Grounding

Article 692 Fuel Cell Systems

Part I. General

692.1 Scope

692.2 Definitions

692.4 Installation

(A) Fuel Cell System

(B) Identification

(C) System Installation

692.6 Listing Requirement

Part II. Circuit Requirements

692.8 Circuit Sizing and Current

(A) Nameplate Rated Circuit Current

(B) Conductor Ampacity and Overcurrent Device Ratings

(C) Ampacity of Grounded or Neutral Conductor

692.9 Overcurrent Protection
(A) Circuits and Equipment

(B) Accessibility

692.10 Stand-Alone Systems

(A) Fuel Cell System Output

(B) Sizing and Protection

(C) Single 120-Volt Nominal Supply

Part III. Disconnecting Means

692.13 All Conductors

692.17 Switch or Circuit Breaker

Part IV. Wiring Methods

692.31 Wiring Systems

Part V. Grounding

692.41 System Grounding

(A) AC Systems

(B) DC Systems

(C) Systems with Alternating-Current

and Direct-Current Grounding Requirements

692.44 Equipment Grounding Conductor

692.45 Size of Equipment Grounding Conductor

692.47 Grounding Electrode System

Part VI. Marking

692.53 Fuel Cell Power Sources

692.54 Fuel Shut-Off

692.56 Stored Energy

Part VII. Connection to Other Circuits

692.59 Transfer Switch

692.60 Identified Interactive Equipment

692.61 Output Characteristics

692.62 Loss of Interactive System Power

692.64 Unbalanced Interconnections

692.65 Utility-Interactive Point of Connection

Article 694 Wind Electric Systems

Part I. General

694.1 Scope

694.2 Definitions

694.7 Installation

(A) Wind Electric Systems

(B) Equipment

(C) Diversion Load Controllers

(D) Surge Protective Devices (SPD)

(E) Receptacles

(F) Poles or Towers Supporting Wind Turbines

Used as a Raceway

(G) Working Clearances

Part II. Circuit Requirements

694.10 Maximum Voltage

(A) Wind Turbine Output Circuits

(B) Direct-Current Utilization Circuits

(C) Circuits over 150 Volts to Ground

694.12 Circuit Sizing and Current

(A) Calculation of Maximum Circuit Current

(B) Ampacity and Overcurrent Device Ratings

694.15 Overcurrent Protection

(A) Circuits and Equipment

(B) Power Transformers

(C) Direct-Current Rating

Part III. Disconnecting Means

694.20 All Conductors

694.22 Additional Provisions

(A) Disconnecting Means

(B) Equipment

(C) Requirements for Disconnecting Means

(D) Equipment That Is Not Readily Accessible

694.23 Turbine Shutdown
## 2017 NEC Table of Contents

<table>
<thead>
<tr>
<th>(A) Manual Shutdown</th>
<th>695.2 Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>(B) Shutdown Procedure</td>
<td>695.3 Power Source(s) for Electric Motor-Driven Fire Pumps</td>
</tr>
<tr>
<td>694.24 Disconnection of Wind Electric System Equipment</td>
<td>(A) Individual Sources</td>
</tr>
<tr>
<td>694.26 Fuses</td>
<td>(B) Multiple Sources</td>
</tr>
<tr>
<td>694.28 Installation and Service of a Wind Turbine</td>
<td>(C) Multibuilding Campus-Style Complexes</td>
</tr>
<tr>
<td>Part IV. Wiring Methods</td>
<td>(D) On-Site Standby Generator as Alternate Source</td>
</tr>
<tr>
<td>694.30 Permitted Methods</td>
<td>(E) Arrangement</td>
</tr>
<tr>
<td>(A) Wiring Systems</td>
<td>(F) Transfer of Power</td>
</tr>
<tr>
<td>(B) Flexible Cords and Cables</td>
<td>(G) Power Source Selection</td>
</tr>
<tr>
<td>(C) Direct-Current Turbine Output Circuits Inside a Building</td>
<td>(H) Overcurrent Device Selection</td>
</tr>
<tr>
<td>Part V. Grounding and Bonding</td>
<td>(I) Phase Converters</td>
</tr>
<tr>
<td>694.40 Equipment Grounding and Bonding</td>
<td>695.4 Continuity of Power</td>
</tr>
<tr>
<td>(A) General</td>
<td>(A) Direct Connection</td>
</tr>
<tr>
<td>(B) Tower Grounding and Bonding</td>
<td>(B) Connection Through Disconnecting Means and Overcurrent Device</td>
</tr>
<tr>
<td>Part VI. Marking</td>
<td>695.5 Transformers</td>
</tr>
<tr>
<td>694.50 Interactive System Point of Interconnection</td>
<td>(A) Size</td>
</tr>
<tr>
<td>694.52 Power Systems Employing Energy Storage</td>
<td>(B) Overcurrent Protection</td>
</tr>
<tr>
<td>694.54 Identification of Power Sources</td>
<td>(C) Feeder Source</td>
</tr>
<tr>
<td>(A) Facilities with Stand-Alone Systems</td>
<td>695.6 Power Wiring</td>
</tr>
<tr>
<td>(B) Facilities with Utility Services and Wind Electric Systems</td>
<td>(A) Supply Conductors</td>
</tr>
<tr>
<td>694.56 Instructions for Disabling Turbine</td>
<td>(B) Conductor Size</td>
</tr>
<tr>
<td>Part VII. Connection to Other Sources</td>
<td>(C) Overload Protection</td>
</tr>
<tr>
<td>694.60 Identified Interactive Equipment</td>
<td>(D) Pump Wiring</td>
</tr>
<tr>
<td>694.62 Installation</td>
<td>(E) Loads Supplied by Controllers and Transfer Switches</td>
</tr>
<tr>
<td>694.66 Operating Voltage Range</td>
<td>(F) Mechanical Protection</td>
</tr>
<tr>
<td>694.68 Point of Connection</td>
<td>(G) Ground-Fault Protection of Equipment</td>
</tr>
<tr>
<td>Article 695 Fire Pumps</td>
<td>(H) Listed Electrical Circuit Protective System to Controller Wiring</td>
</tr>
<tr>
<td>695.1 Scope</td>
<td>(I) Junction Boxes</td>
</tr>
<tr>
<td>(A) Covered</td>
<td>(J) Raceway Terminations</td>
</tr>
<tr>
<td>(B) Not Covered</td>
<td></td>
</tr>
<tr>
<td>Article 695</td>
<td>695.7 Voltage Drop</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------------</td>
</tr>
<tr>
<td></td>
<td>(A) Starting</td>
</tr>
<tr>
<td></td>
<td>(B) Running</td>
</tr>
<tr>
<td>695.10 Listed Equipment</td>
<td>700.5 Transfer Equipment</td>
</tr>
<tr>
<td>695.12 Equipment Location</td>
<td>(A) General</td>
</tr>
<tr>
<td></td>
<td>(B) Bypass Isolation Switches</td>
</tr>
<tr>
<td></td>
<td>(C) Automatic Transfer Switches</td>
</tr>
<tr>
<td></td>
<td>(D) Use</td>
</tr>
<tr>
<td></td>
<td>(E) Documentation</td>
</tr>
<tr>
<td></td>
<td>(F) Mounting</td>
</tr>
<tr>
<td></td>
<td>(G) Energized Equipment</td>
</tr>
<tr>
<td></td>
<td>(H) Protection Against Pump Water</td>
</tr>
<tr>
<td></td>
<td>(I) Protection Against Live Parts</td>
</tr>
<tr>
<td></td>
<td>(J) Protection Against Static Electricity</td>
</tr>
<tr>
<td></td>
<td>(K) Protection Against Water</td>
</tr>
<tr>
<td></td>
<td>(L) Protection Against Terminals</td>
</tr>
<tr>
<td></td>
<td>(M) Protection Against Grounding</td>
</tr>
<tr>
<td></td>
<td>(N) Protection Against Looping</td>
</tr>
<tr>
<td></td>
<td>(O) Protection Against System Failure</td>
</tr>
<tr>
<td></td>
<td>(P) Protection Against System Absence</td>
</tr>
<tr>
<td></td>
<td>(Q) Protection Against System Change</td>
</tr>
<tr>
<td></td>
<td>(R) Protection Against System Damage</td>
</tr>
<tr>
<td></td>
<td>(S) Protection Against System Loss</td>
</tr>
<tr>
<td></td>
<td>(T) Protection Against System Overload</td>
</tr>
<tr>
<td></td>
<td>(U) Protection Against System Overcurrent</td>
</tr>
<tr>
<td></td>
<td>(V) Protection Against System Overvoltage</td>
</tr>
<tr>
<td></td>
<td>(W) Protection Against System Undervoltage</td>
</tr>
<tr>
<td></td>
<td>(X) Protection Against System Short-Circuit</td>
</tr>
<tr>
<td></td>
<td>(Y) Protection Against System Open-Circuit</td>
</tr>
<tr>
<td></td>
<td>(Z) Protection Against System Ground-Fault</td>
</tr>
<tr>
<td></td>
<td>(AA) Protection Against System Earth-Fault</td>
</tr>
<tr>
<td><em>Article 700 Emergency Systems</em></td>
<td></td>
</tr>
<tr>
<td>Part I. General</td>
<td>700.1 Scope</td>
</tr>
<tr>
<td></td>
<td>700.2 Definitions</td>
</tr>
<tr>
<td></td>
<td>700.3 Tests and Maintenance</td>
</tr>
<tr>
<td></td>
<td>(A) Conduct or Witness Test</td>
</tr>
<tr>
<td></td>
<td>(B) Tested Periodically</td>
</tr>
<tr>
<td></td>
<td>(C) Maintenance</td>
</tr>
<tr>
<td></td>
<td>(D) Written Record</td>
</tr>
<tr>
<td></td>
<td>(E) Testing Under Load</td>
</tr>
<tr>
<td></td>
<td>(F) Temporary Source of Power for Maintenance</td>
</tr>
<tr>
<td></td>
<td>or Repair of the Alternate Source of Power</td>
</tr>
<tr>
<td></td>
<td>700.4 Capacity</td>
</tr>
<tr>
<td></td>
<td>(A) Capacity and Rating</td>
</tr>
<tr>
<td></td>
<td>700.5 Transfer Equipment</td>
</tr>
<tr>
<td></td>
<td>(A) General</td>
</tr>
<tr>
<td></td>
<td>(B) Bypass Isolation Switches</td>
</tr>
<tr>
<td></td>
<td>(C) Automatic Transfer Switches</td>
</tr>
<tr>
<td></td>
<td>(D) Use</td>
</tr>
<tr>
<td></td>
<td>(E) Documentation</td>
</tr>
<tr>
<td></td>
<td>(F) Mounting</td>
</tr>
<tr>
<td></td>
<td>(G) Energized Equipment</td>
</tr>
<tr>
<td></td>
<td>(H) Protection Against Live Parts</td>
</tr>
<tr>
<td></td>
<td>(I) Protection Against Static Electricity</td>
</tr>
<tr>
<td></td>
<td>(J) Protection Against Water</td>
</tr>
<tr>
<td></td>
<td>(K) Protection Against Terminals</td>
</tr>
<tr>
<td></td>
<td>(L) Protection Against Grounding</td>
</tr>
<tr>
<td></td>
<td>(M) Protection Against Looping</td>
</tr>
<tr>
<td></td>
<td>(N) Protection Against System Failure</td>
</tr>
<tr>
<td></td>
<td>(O) Protection Against System Absence</td>
</tr>
<tr>
<td></td>
<td>(P) Protection Against System Change</td>
</tr>
<tr>
<td></td>
<td>(Q) Protection Against System Damage</td>
</tr>
<tr>
<td></td>
<td>(R) Protection Against System Loss</td>
</tr>
<tr>
<td></td>
<td>(S) Protection Against System Overload</td>
</tr>
<tr>
<td></td>
<td>(T) Protection Against System Overcurrent</td>
</tr>
<tr>
<td></td>
<td>(U) Protection Against System Overvoltage</td>
</tr>
<tr>
<td></td>
<td>(V) Protection Against System Undervoltage</td>
</tr>
<tr>
<td></td>
<td>(W) Protection Against System Short-Circuit</td>
</tr>
<tr>
<td></td>
<td>(X) Protection Against System Open-Circuit</td>
</tr>
<tr>
<td></td>
<td>(Y) Protection Against System Ground-Fault</td>
</tr>
<tr>
<td></td>
<td>(Z) Protection Against System Earth-Fault</td>
</tr>
<tr>
<td></td>
<td>(AA) Protection Against System Earth-Fault</td>
</tr>
<tr>
<td>Part II. Circuit Wiring</td>
<td>700.6 Signals</td>
</tr>
<tr>
<td></td>
<td>(A) Malfunction</td>
</tr>
<tr>
<td></td>
<td>(B) Carrying Load</td>
</tr>
<tr>
<td></td>
<td>(C) Not Functioning</td>
</tr>
<tr>
<td></td>
<td>(D) Ground Fault</td>
</tr>
<tr>
<td></td>
<td>(E) Ground Fault</td>
</tr>
<tr>
<td></td>
<td>(F) Ground Fault</td>
</tr>
<tr>
<td></td>
<td>(G) Ground Fault</td>
</tr>
<tr>
<td></td>
<td>(H) Ground Fault</td>
</tr>
<tr>
<td></td>
<td>(I) Ground Fault</td>
</tr>
<tr>
<td></td>
<td>(J) Ground Fault</td>
</tr>
<tr>
<td></td>
<td>(K) Ground Fault</td>
</tr>
<tr>
<td></td>
<td>(L) Ground Fault</td>
</tr>
<tr>
<td></td>
<td>(M) Ground Fault</td>
</tr>
<tr>
<td></td>
<td>(N) Ground Fault</td>
</tr>
<tr>
<td></td>
<td>(O) Ground Fault</td>
</tr>
<tr>
<td></td>
<td>(P) Ground Fault</td>
</tr>
<tr>
<td></td>
<td>(Q) Ground Fault</td>
</tr>
<tr>
<td></td>
<td>(R) Ground Fault</td>
</tr>
<tr>
<td></td>
<td>(S) Ground Fault</td>
</tr>
<tr>
<td></td>
<td>(T) Ground Fault</td>
</tr>
<tr>
<td></td>
<td>(U) Ground Fault</td>
</tr>
<tr>
<td></td>
<td>(V) Ground Fault</td>
</tr>
<tr>
<td></td>
<td>(W) Ground Fault</td>
</tr>
<tr>
<td></td>
<td>(X) Ground Fault</td>
</tr>
<tr>
<td></td>
<td>(Y) Ground Fault</td>
</tr>
<tr>
<td></td>
<td>(Z) Ground Fault</td>
</tr>
<tr>
<td></td>
<td>(AA) Ground Fault</td>
</tr>
<tr>
<td>Part III. Sources of Power</td>
<td>700.8 Surge Protection</td>
</tr>
<tr>
<td></td>
<td>700.10 Wiring, Emergency System</td>
</tr>
<tr>
<td></td>
<td>(A) Identification</td>
</tr>
<tr>
<td></td>
<td>(B) Wiring</td>
</tr>
<tr>
<td></td>
<td>(C) Wiring Design and Location</td>
</tr>
<tr>
<td></td>
<td>(D) Fire Protection</td>
</tr>
<tr>
<td>Part IV. Emergency System Circuits for Lighting and Power</td>
<td>700.15 Loads on Emergency Branch Circuits</td>
</tr>
<tr>
<td>Article</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>700.16</td>
<td>Emergency Illumination</td>
</tr>
<tr>
<td>700.17</td>
<td>Branch Circuits for Emergency Lighting</td>
</tr>
<tr>
<td>700.18</td>
<td>Circuits for Emergency Power</td>
</tr>
<tr>
<td>700.19</td>
<td>Multiwire Branch Circuits</td>
</tr>
<tr>
<td>700.20</td>
<td>Switch Requirements</td>
</tr>
<tr>
<td>700.21</td>
<td>Switch Location</td>
</tr>
<tr>
<td>700.22</td>
<td>Exterior Lights</td>
</tr>
<tr>
<td>700.23</td>
<td>Dimmer and Relay Systems</td>
</tr>
<tr>
<td>700.24</td>
<td>Directly Controlled Luminaires</td>
</tr>
<tr>
<td>700.25</td>
<td>Branch Circuit Emergency Lighting Transfer Switch</td>
</tr>
<tr>
<td>700.26</td>
<td>Automatic Load Control Relay</td>
</tr>
<tr>
<td>Part V. Control — Emergency Lighting Circuits</td>
<td></td>
</tr>
<tr>
<td>701.7</td>
<td>Signs</td>
</tr>
<tr>
<td>701.10</td>
<td>Wiring Legally Required Standby Systems</td>
</tr>
<tr>
<td>Part II. Circuit Wiring</td>
<td></td>
</tr>
<tr>
<td>701.12</td>
<td>General Requirements</td>
</tr>
<tr>
<td>Part III. Sources of Power</td>
<td></td>
</tr>
<tr>
<td>701.10</td>
<td>Accessibility</td>
</tr>
<tr>
<td>701.11</td>
<td>Ground-Fault Protection of Equipment</td>
</tr>
<tr>
<td>701.12</td>
<td>Selective Coordination</td>
</tr>
<tr>
<td>Part VI. Overcurrent Protection</td>
<td></td>
</tr>
<tr>
<td>701.15</td>
<td>Accessibility</td>
</tr>
<tr>
<td>701.16</td>
<td>Ground-Fault Protection of Equipment</td>
</tr>
<tr>
<td>701.17</td>
<td>Selective Coordination</td>
</tr>
<tr>
<td>Part I. General</td>
<td></td>
</tr>
<tr>
<td>702.1</td>
<td>Scope</td>
</tr>
<tr>
<td>702.2</td>
<td>Definition</td>
</tr>
<tr>
<td>702.4</td>
<td>Capacity and Rating</td>
</tr>
<tr>
<td>702.5</td>
<td>Transfer Equipment</td>
</tr>
<tr>
<td>702.6</td>
<td>Signals</td>
</tr>
<tr>
<td>Part I. General</td>
<td></td>
</tr>
<tr>
<td>702.1</td>
<td>Scope</td>
</tr>
<tr>
<td>702.2</td>
<td>Definition</td>
</tr>
<tr>
<td>702.4</td>
<td>Capacity and Rating</td>
</tr>
<tr>
<td>702.5</td>
<td>Transfer Equipment</td>
</tr>
<tr>
<td>702.6</td>
<td>Signals</td>
</tr>
</tbody>
</table>
(B) Carrying Load

702.7 Signs

(A) Standby

(B) Grounding

(C) Power Inlet

Part II. Wiring

702.10 Wiring Optional Standby Systems

(A) Separately Derived System

(B) Nonseparately Derived System

702.11 Portable Generator Grounding

702.12 Outdoor Generator Sets

(A) Portable Generators Greater Than 15 kW and Permanently Installed Generators

(B) Portable Generators 15 kW or Less

(C) Power Inlets Rated at 100 Amperes or Greater, for Portable Generators

Article 705 Interconnected Electric Power

Production Sources

Part I. General

705.1 Scope

705.2 Definitions

705.3 Other Articles

705.6 Equipment Approval

705.8 System Installation

705.10 Directory

705.12 Point of Connection

(A) Supply Side

(B) Load Side

705.14 Output Characteristics

705.16 Interrupting and Short-Circuit Current Rating

705.20 Disconnecting Means, Sources

705.21 Disconnecting Means, Equipment

705.22 Disconnect Device

705.23 Interactive System Disconnecting Means

705.30 Overcurrent Protection

(A) Solar Photovoltaic Systems

(B) Transformers

(C) Fuel Cell Systems

(D) Interactive Inverters

(E) Generators

705.31 Location of Overcurrent Protection

705.32 Ground-Fault Protection

705.40 Loss of Primary Source

705.42 Loss of 3-Phase Primary Source

705.50 Grounding

Part II. Interactive Inverters

705.60 Circuit Sizing and Current

(A) Calculation of Maximum Circuit Current

(B) Ampacity and Overcurrent Device Ratings

705.65 Overcurrent Protection

(A) Circuits and Equipment

(B) Power Transformers

(C) Conductor Ampacity

705.70 Interactive Inverters Mounted in Not Readily Accessible Locations

705.80 Utility-Interactive Power Systems Employing Energy Storage

705.82 Hybrid Systems

705.95 Ampacity of Neutral Conductor

(A) Neutral Conductor for Single Phase, 2-Wire Inverter Output

(B) Neutral Conductor for Instrumentation, Voltage, Detection or Phase Detection

705.100 Unbalanced Interconnections

(A) Single Phase

(B) Three Phase
Article 706 Energy Storage Systems

Part I. General
706.1 Scope
706.2 Definitions
706.3 Other Articles
706.4 System Classification
706.5 Equipment
706.6 Multiple Systems
706.7 Disconnecting Means
(A) ESS Disconnecting Means
(B) Remote Actuation
(C) Busway
(D) Notification
(E) Partitions and Distance
706.8 Connection to Other Energy Sources
(A) Load Disconnect
(B) Identified Interactive Equipment
(C) Loss of Interactive System Power
(D) Unbalanced Interconnections
(E) Point of Connection
706.10 Energy Storage System Locations
(A) Ventilation
(B) Guarding of Live Parts
(C) Spaces About ESS Components
(D) Egress

Part II. Circuit Requirements
706.20 Circuit Sizing and Current
706.21 Overcurrent Protection
(A) Circuits and Equipment
(B) Overcurrent Device Ampere Ratings
(C) Direct Current Rating
(D) Current Limiting
(E) Fuses
(F) Location
706.23 Charge Control
(A) General
(B) Diversion Charge Controller
(C) Charge Controllers and DC-to-DC Converters

Part III. Electrochemical Energy Storage Systems
706.30 Installation of Batteries
(A) Dwelling Units
(B) Disconnection of Series Battery Circuits
(C) Storage System Maintenance Disconnecting Means
(D) Storage Systems of More Than 100 Volts

706.31 Battery and Cell Terminations
(A) Corrosion Prevention
(B) Intercell and Intertier Conductors and Connections
(C) Battery Terminals
# 2017 NEC Table of Contents

<table>
<thead>
<tr>
<th>Article 708</th>
<th>Critical Operations Power Systems (COPS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part I. General</td>
<td></td>
</tr>
<tr>
<td>708.1 Scope</td>
<td></td>
</tr>
<tr>
<td>708.2 Definitions</td>
<td></td>
</tr>
<tr>
<td>708.4 Risk Assessment</td>
<td></td>
</tr>
<tr>
<td>(A) Conducting Risk Assessment</td>
<td></td>
</tr>
<tr>
<td>(B) Identification of Hazards</td>
<td></td>
</tr>
<tr>
<td>(C) Developing Mitigation Strategy</td>
<td></td>
</tr>
<tr>
<td>708.5 Physical Security</td>
<td></td>
</tr>
<tr>
<td>(A) Risk Assessment</td>
<td></td>
</tr>
<tr>
<td>(B) Restricted Access</td>
<td></td>
</tr>
<tr>
<td>708.6 Testing and Maintenance</td>
<td></td>
</tr>
<tr>
<td>(A) Conduct or Witness Test</td>
<td></td>
</tr>
<tr>
<td>(B) Tested Periodically</td>
<td></td>
</tr>
<tr>
<td>(C) Maintenance</td>
<td></td>
</tr>
<tr>
<td>(D) Written Record</td>
<td></td>
</tr>
<tr>
<td>(E) Testing Under Load</td>
<td></td>
</tr>
<tr>
<td>708.8 Commissioning</td>
<td></td>
</tr>
<tr>
<td>(A) Commissioning Plan</td>
<td></td>
</tr>
<tr>
<td>Part II. Circuit Wiring and Equipment</td>
<td></td>
</tr>
<tr>
<td>708.10 Feeder and Branch Circuit Wiring</td>
<td></td>
</tr>
<tr>
<td>Part III. Power Sources and Connection</td>
<td></td>
</tr>
<tr>
<td>708.20 Sources of Power</td>
<td></td>
</tr>
<tr>
<td>(A) General Requirements</td>
<td></td>
</tr>
<tr>
<td>(B) Fire Protection</td>
<td></td>
</tr>
<tr>
<td>(C) Grounding</td>
<td></td>
</tr>
<tr>
<td>(D) Surge Protection Devices</td>
<td></td>
</tr>
<tr>
<td>(E) Storage Battery</td>
<td></td>
</tr>
<tr>
<td>(F) Generator Set</td>
<td></td>
</tr>
<tr>
<td>(G) Uninterruptible Power Supplies</td>
<td></td>
</tr>
<tr>
<td>(H) Fuel Cell System</td>
<td></td>
</tr>
<tr>
<td>708.21 Ventilation</td>
<td></td>
</tr>
<tr>
<td>708.22 Capacity of Power Sources</td>
<td></td>
</tr>
<tr>
<td>(A) Capacity and Rating</td>
<td></td>
</tr>
<tr>
<td>(B) Selective Load Pickup, Load Shedding, and Peak Load Shaving</td>
<td></td>
</tr>
<tr>
<td>(C) Duration of COPS Operation</td>
<td></td>
</tr>
<tr>
<td>708.24 Transfer Equipment</td>
<td></td>
</tr>
<tr>
<td>Part IV. Flow Battery Energy Storage Systems</td>
<td></td>
</tr>
<tr>
<td>706.40 General</td>
<td></td>
</tr>
<tr>
<td>706.41 Electrolyte Classification</td>
<td></td>
</tr>
<tr>
<td>706.42 Electrolyte Containment</td>
<td></td>
</tr>
<tr>
<td>706.43 Flow Controls</td>
<td></td>
</tr>
<tr>
<td>706.44 Pumps and Other Fluid Handling Equipment</td>
<td></td>
</tr>
<tr>
<td>Part V. Other Energy Storage Technologies</td>
<td></td>
</tr>
<tr>
<td>706.50 General</td>
<td></td>
</tr>
</tbody>
</table>
## 2017 NEC Table of Contents

(B) Bypass Isolation Switches

(C) Automatic Transfer Switches

(D) Use

(E) Documentation

708.30 Branch Circuits Supplied by COPS

### Part IV. Overcurrent Protection

708.50 Accessibility

708.52 Ground-Fault Protection of Equipment

(A) Applicability

(B) Feeders

(C) Testing

(D) Selectivity

708.54 Selective Coordination

### Part V. System Performance and Analysis

708.64 Emergency Operations Plan

### Article 710 Stand-Alone Systems

710.1 Scope

710.6 Equipment Approval

710.15 General

(A) Supply Output

(B) Sizing and Protection

(C) Single 120-Volt Supply

(D) Energy Storage or Backup Power System Requirements

(E) Back-Fed Circuit Breakers

(F) Voltage and Frequency Control

### Article 712 Direct Current Microgrids

Part I. General

712.1 Scope

712.2 Definitions

712.3 Other Articles

712.4 Listing and Labeling

712.10 Directory

### Part II. Circuit Requirements

712.25 Identification of Circuit Conductors

712.30 System Voltage

### Part III. Disconnecting Means

712.34 DC Source Disconnecting Means

712.35 Disconnection of Ungrounded Conductors

712.37 Directional Current Devices

### Part IV. Wiring Methods

712.52 System Grounding

(A) General

(B) Over 300 Volts

712.55 Ground Fault Detection Equipment

712.57 Arc Fault Protection

### Part V. Marking

712.62 Distribution Equipment and Conductors

712.65 Available DC Short-Circuit Current

(A) Field Marking

(B) Modifications

### Part VI. Protection

712.70 Overcurrent Protection

712.72 Interrupting and Short-Circuit Current Ratings

### Part VII. Systems over 1000 Volts

712.80 General

### Article 720 Circuits and Equipment Operating at Less Than 50 Volts

720.1 Scope

720.2 Other Articles

720.3 Hazardous (Classified) Locations

720.4 Conductors

720.5 Lampholders

720.6 Receptacle Rating

720.7 Receptacles Required

720.9 Batteries
<table>
<thead>
<tr>
<th>Article 725 Class 1, Class 2, and Class 3</th>
<th>2017 NEC TABLE OF CONTENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote-Control, Signaling, and Power-Limited Circuits</td>
<td>720.11 Mechanical Execution of Work</td>
</tr>
<tr>
<td>Part I. General</td>
<td>725.41 Class 1 Circuit Classifications and Power Source Requirements</td>
</tr>
<tr>
<td>725.1 Scope</td>
<td>(A) Class 1 Power-Limited Circuits</td>
</tr>
<tr>
<td>725.2 Definitions</td>
<td>(B) Class 1 Remote-Control and Signaling Circuits</td>
</tr>
<tr>
<td>725.3 Other Articles</td>
<td>725.43 Class 1 Circuit Overcurrent Protection</td>
</tr>
<tr>
<td>(A) Number and Size of Conductors in Raceway</td>
<td>725.45 Class 1 Circuit Overcurrent Device Location</td>
</tr>
<tr>
<td>(B) Spread of Fire or Products of Combustion</td>
<td>(A) Point of Supply</td>
</tr>
<tr>
<td>(C) Ducts, Plenums, and Other Air-Handling Spaces</td>
<td>(B) Feeder Taps</td>
</tr>
<tr>
<td>(D) Hazardous (Classified) Locations</td>
<td>(C) Branch-Circuit Taps</td>
</tr>
<tr>
<td>(E) Cable Trays</td>
<td>(D) Primary Side of Transformer</td>
</tr>
<tr>
<td>(F) Motor Control Circuits</td>
<td>(E) Input Side of Electronic Power Source</td>
</tr>
<tr>
<td>(G) Instrumentation Tray Cable</td>
<td>725.46 Class 1 Circuit Wiring Methods</td>
</tr>
<tr>
<td>(H) Raceways Exposed to Different Temperatures</td>
<td>725.48 Conductors of Different Circuits in the Same Cable, Cable Tray, Enclosure, or Raceway</td>
</tr>
<tr>
<td>(I) Vertical Support for Fire-Rated Cables and Conductors</td>
<td>(A) Two or More Class 1 Circuits</td>
</tr>
<tr>
<td>(J) Bushing</td>
<td>(B) Class 1 Circuits with Power-Supply Circuits</td>
</tr>
<tr>
<td>(K) Installation of Conductors with Other Systems</td>
<td>725.49 Class 1 Circuit Conductors</td>
</tr>
<tr>
<td>(L) Corrosive, Damp, or Wet Locations</td>
<td>(A) Sizes and Use</td>
</tr>
<tr>
<td>(M) Cable Routing Assemblies</td>
<td>(B) Insulation</td>
</tr>
<tr>
<td>(N) Communications Raceways</td>
<td>725.51 Number of Conductors in Cable Trays and Raceway, and Ampacity Adjustment</td>
</tr>
<tr>
<td>725.21 Access to Electrical Equipment Behind Panels Designed to Allow Access</td>
<td>(A) Class 1 Circuit Conductors</td>
</tr>
<tr>
<td>725.24 Mechanical Execution of Work</td>
<td>(B) Power-Supply Conductors and Class 1 Circuit Conductors</td>
</tr>
<tr>
<td>725.25 Abandoned Cables</td>
<td>(C) Class 1 Circuit Conductors in Cable Trays</td>
</tr>
<tr>
<td>725.30 Class 1, Class 2, and Class 3 Circuit Identification</td>
<td>725.52 Circuits Extending Beyond One Building</td>
</tr>
<tr>
<td>725.31 Safety-Control Equipment</td>
<td>Part III. Class 2 and Class 3 Circuits</td>
</tr>
<tr>
<td>(A) Remote-Control Circuits</td>
<td>725.121 Power Sources for Class 2 and Class 3 Circuits</td>
</tr>
<tr>
<td>(B) Physical Protection</td>
<td>(A) Power Source</td>
</tr>
<tr>
<td>725.35 Class 1, Class 2, and Class 3 Circuit Requirements</td>
<td>(B) Interconnection of Power Sources</td>
</tr>
<tr>
<td>Part II. Class 1 Circuits</td>
<td>(C) Marking</td>
</tr>
<tr>
<td>725.42 Class 1 Circuit Requirements</td>
<td>725.124 Circuit Marking</td>
</tr>
<tr>
<td>725.47 Conductors of Different Circuits in the Same Raceway, Cable, Cable Tray, Enclosure, or Raceway</td>
<td></td>
</tr>
<tr>
<td>725.48 Conductors of Different Circuits in the Same Cable, Cable Tray, Enclosure, or Raceway</td>
<td></td>
</tr>
</tbody>
</table>

111 | Page
### 2017 NEC Table of Contents

- **or Class 3 Power Source**
- **725.130 Wiring Methods and Materials on Load Side of the Class 2 or Class 3 Power Source**
  - (A) Class 1 Wiring Methods and Materials
  - (B) Class 2 and Class 3 Wiring Methods
- **725.133 Installation of Conductors and Equipment in Cables, Compartments, Cable Trays, Enclosures, Manholes, Outlet Boxes, Device Boxes, Raceways, and Cable Routing Assemblies for Class 2 and Class 3 Circuits**
- **725.135 Installation of Class 2, Class 3, and PLTC Cables**
  - (A) Listing
  - (B) Ducts Specifically Fabricated for Environmental Air
  - (C) Other Spaces Used for Environmental Air (Plenums)
  - (D) Risers — Cables in Vertical Runs
  - (E) Risers — Cables in Metal Raceways
  - (F) Risers — Cables in Fireproof Shafts
  - (G) Risers — One- and Two-Family Dwellings
  - (H) Cable Trays
  - (I) Cross-Connect Arrays
  - (J) Industrial Establishments
  - (K) Other Building Locations
  - (L) Multifamily Dwellings
  - (M) One- and Two-Family Dwellings
- **725.136 Separation from Electric Light, Power, Class 1, Non–Power-Limited Fire Alarm Circuit Conductors, and Medium-Power NetworkPowered Broadband Communications Cables**
  - (A) General
  - (B) Separated by Barriers
  - (C) Raceways Within Enclosures
  - (D) Associated Systems Within Enclosures
  - (E) Enclosures with Single Opening
  - (F) Manholes
  - (G) Cable Trays
  - (H) In Hoistways
  - (I) Other Applications
- **725.139 Installation of Conductors of Different Circuits in the Same Cable, Enclosure, Cable Tray, Raceway, or Cable Routing Assembly**
  - (A) Two or More Class 2 Circuits
  - (B) Two or More Class 3 Circuits
  - (C) Class 2 Circuits with Class 3 Circuits
  - (D) Class 2 and Class 3 Circuits with Communications Circuits
  - (E) Class 2 or Class 3 Cables with Other Circuit Cables
  - (F) Class 2 or Class 3 Conductors or Cables and Audio System Circuits
- **725.141 Installation of Circuit Conductors Extending Beyond One Building**
- **725.143 Support of Conductors**
- **725.144 Transmission of Power and Data**
  - (A) Use of Class 2 or Class 3 Cables to Transmit Power and Data
  - (B) Use of Class 2-LP or Class 3-LP Cables to Transmit Power and Data
- **725.154 Applications of Listed Class 2, Class 3, and PLTC Cables**
  - (A) Class 2 and Class 3 Cable Substitutions
  - (B) Class 2, Class 3, PLTC Circuit Integrity (CI) Cable or Electrical Circuit Protective System
  - (C) Thermocouple Circuits
- **Part IV. Listing Requirements**
<table>
<thead>
<tr>
<th>Article</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>725.170</td>
<td>Listing and Marking of Equipment for Power and Data Transmission</td>
</tr>
<tr>
<td>725.179</td>
<td>Listing and Marking of Class 2, Class 3, and Type PLTC Cables</td>
</tr>
<tr>
<td>727.1</td>
<td>Scope</td>
</tr>
<tr>
<td>727.2</td>
<td>Definition</td>
</tr>
<tr>
<td>727.3</td>
<td>Other Articles</td>
</tr>
<tr>
<td>727.4</td>
<td>Uses Permitted</td>
</tr>
<tr>
<td>727.5</td>
<td>Uses Not Permitted</td>
</tr>
<tr>
<td>727.6</td>
<td>Construction</td>
</tr>
<tr>
<td>727.7</td>
<td>Marking</td>
</tr>
<tr>
<td>727.8</td>
<td>Allowable Ampacity</td>
</tr>
<tr>
<td>727.9</td>
<td>Overcurrent Protection</td>
</tr>
<tr>
<td>727.10</td>
<td>Bends</td>
</tr>
<tr>
<td>728.1</td>
<td>Scope</td>
</tr>
<tr>
<td>728.2</td>
<td>Definition</td>
</tr>
<tr>
<td>728.3</td>
<td>Other Articles</td>
</tr>
<tr>
<td>728.4</td>
<td>General</td>
</tr>
<tr>
<td>728.5</td>
<td>Installations</td>
</tr>
<tr>
<td>728.60</td>
<td>Grounding</td>
</tr>
<tr>
<td>728.120</td>
<td>Marking</td>
</tr>
<tr>
<td>750.1</td>
<td>Scope</td>
</tr>
<tr>
<td>750.2</td>
<td>Definitions</td>
</tr>
<tr>
<td>750.20</td>
<td>Alternate Power Sources</td>
</tr>
<tr>
<td>750.30</td>
<td>Load Management</td>
</tr>
<tr>
<td>750.50</td>
<td>Field Markings</td>
</tr>
<tr>
<td>760.1</td>
<td>Scope</td>
</tr>
<tr>
<td>760.2</td>
<td>Definitions</td>
</tr>
<tr>
<td>760.3</td>
<td>Other Articles</td>
</tr>
<tr>
<td>760.4</td>
<td>Alternate Power Sources</td>
</tr>
<tr>
<td>760.5</td>
<td>Load Management</td>
</tr>
<tr>
<td>760.6</td>
<td>Field Markings</td>
</tr>
<tr>
<td>760.7</td>
<td>Raceways or Sleeves Exposed to Different Temperatures</td>
</tr>
<tr>
<td>760.8</td>
<td>Vertical Support for Fire Rated Cables</td>
</tr>
<tr>
<td>760.9</td>
<td>Optical Fiber Cables</td>
</tr>
<tr>
<td>760.10</td>
<td>Installation of Conductors with Other Systems</td>
</tr>
<tr>
<td>760.11</td>
<td>Raceways or Sleeves Exposed to Different Temperatures</td>
</tr>
<tr>
<td>760.12</td>
<td>Vertical Support for Fire Rated Cables and Raceways</td>
</tr>
</tbody>
</table>

**Article 727 Instrumentation Tray Cable: Type ITC**

- Scope
- Definition
- Other Articles
- Uses Permitted
- Uses Not Permitted
- Construction
- Marking
- Allowable Ampacity
- Overcurrent Protection
- Bends

**Article 728 Fire-Resistive Cable Systems**

- Scope
- Definition
- Other Articles
- General
- Installations
- Mounting

**Article 750 Energy Management Systems**

- Scope
- Definitions
- Alternate Power Sources
- Load Management
- Field Markings

**Article 760 Fire Alarm Systems**

Part I. General

- Scope
- Definitions
- Other Articles
- Alternate Power Sources
- Load Management
- Field Markings
- Raceways or Sleeves Exposed to Different Temperatures
- Vertical Support for Fire Rated Cables and Raceways
- Optical Fiber Cables
- Installation of Conductors with Other Systems
- Raceways or Sleeves Exposed to Different Temperatures
- Vertical Support for Fire Rated Cables and Raceways
Conductors

(J) Number and Size of Cables and Conductors in Raceway

(K) Bushing

(L) Cable Routing Assemblies

(M) Communications Raceways

760.21 Access to Electrical Equipment Behind Panels Designed to Allow Access

760.24 Mechanical Execution of Work

(A) General

(B) Circuit Integrity (CI) Cable

760.25 Abandoned Cables

760.30 Fire Alarm Circuit Identification

760.32 Fire Alarm Circuits Extending Beyond One Building

760.35 Fire Alarm Circuit Requirements

(A) Non–Power-Limited Fire Alarm (NPLFA)

Circuits

(B) Power-Limited Fire Alarm (PLFA) Circuits

Part II. Non–Power-Limited Fire Alarm (NPLFA) Circuits

760.41 NPLFA Circuit Power Source Requirements

(A) Power Source

(B) Branch Circuit

760.43 NPLFA Circuit Overcurrent Protection

760.45 NPLFA Circuit Overcurrent Device Location

760.46 NPLFA Circuit Wiring

760.48 Conductors of Different Circuits in Same Cable, Enclosure, or Raceway

(A) Class 1 with NPLFA Circuits

(B) Fire Alarm with Power-Supply Circuits

760.49 NPLFA Circuit Conductors

(A) Sizes and Use

(B) Insulation

(C) Conductor Materials

760.51 Number of Conductors in Cable Trays and Raceways, and Ampacity Adjustment Factors

(A) NPLFA Circuits and Class 1 Circuits

(B) Power-Supply Conductors and NPLFA Circuit Conductors

(C) Cable Trays

760.53 Multiconductor NPLFA Cables

(A) NPLFA Wiring Method

(B) Applications of Listed NPLFA Cables

Part III. Power-Limited Fire Alarm (PLFA) Circuits

760.121 Power Sources for PLFA Circuits

(A) Power Source

(B) Branch Circuit

760.124 Circuit Marking

760.127 Wiring Methods on Supply Side of the PLFA Power Source

760.130 Wiring Methods and Materials on Load Side of the PLFA Power Source

(A) NPLFA Wiring Methods and Materials

(B) PLFA Wiring Methods and Materials

760.133 Installation of Conductors and Equipment in Cables, Compartments, Cable Trays, Enclosures, Manholes, Outlet Boxes, Device Boxes, Raceways, and Cable Routing Assemblies for Power-Limited Fire Alarm Circuits

760.135 Installation of PLFA Cables in Buildings

(A) Listing

(B) Ducts Specifically Fabricated for Environmental Air

(C) Other Spaces Used For Environmental Air (Plenums)

(D) Risers — Cables in Vertical Runs
### 760.136 Separation from Electric Light, Power, Class 1, NPLFA, and Medium-Power Network-Powered Broadband Communications Circuit Conductors

#### (A) General

#### (B) Separated by Barriers

#### (C) Raceways Within Enclosures

#### (D) Associated Systems Within Enclosures

#### (E) Enclosures with Single Opening

#### (F) In Hoistways

#### (G) Other Applications

### 760.139 Installation of Conductors of Different PLFA Circuits, Class 2, Class 3, and Communications Circuits in the Same Cable, Enclosure, Cable Tray, Raceway, or Cable Routing Assembly

#### (A) Two or More PLFA Circuits

#### (B) Class 2 Circuits with PLFA Circuits

#### (C) Low-Power Network-Powered Broadband Communications Cables and PLFA Cables

#### (D) Audio System Circuits and PLFA Circuits

### 760.142 Conductor Size

### 760.143 Support of Conductors

### 760.145 Current-Carrying Continuous Line-Type Fire Detectors

#### (A) Application

#### (B) Installation

### Article 770 Optical Fiber Cables

#### Part I. General

#### 770.1 Scope

#### 770.2 Definitions

#### 770.3 Other Articles

#### (A) Hazardous (Classified) Locations

#### (B) Cables in Ducts for Dust, Loose Stock,
or Vapor Removal

(C) Composite Cables

770.21 Access to Electrical Equipment Behind Panels
Designed to Allow Access

770.24 Mechanical Execution of Work

770.25 Abandoned Cables

770.26 Spread of Fire or Products of Combustion

Part II. Cables Outside and Entering Buildings

770.44 Overhead (Aerial) Optical Fiber Cables
(A) On Poles and In-Span
(B) Above Roofs

770.47 Underground Optical Fiber Cables Entering Buildings
(A) Underground Systems with Electric Light, Power, Class 1, or Non–Power-Limited Fire Alarm Circuit Conductors
(B) Direct-Buried Cables and Raceways

770.48 Unlisted Cables Entering Buildings
(A) Conductive and Nonconductive Cables
(B) Nonconductive Cables in Raceway

770.49 Metallic Entrance Conduit Grounding

Part III. Protection

770.93 Grounding or Interruption of Non–Current-Carrying Metallic Members of Optical Fiber Cables
(A) Entering Buildings
(B) Terminating on the Outside of Buildings

Part IV. Grounding Methods

770.100 Entrance Cable Bonding and Grounding
(A) Bonding Conductor or Grounding Electrode Conductor
(B) Electrode

(C) Electrode Connection
(D) Bonding of Electrodes

770.106 Grounding and Bonding of Entrance Cables at Mobile Homes

(A) Grounding
(B) Bonding

Part V. Installation Methods Within Buildings

770.110 Raceways and Cable Routing Assemblies for Optical Fiber Cables
(A) Types of Raceways
(B) Raceway Fill for Optical Fiber Cables
(C) Cable Routing Assemblies

770.113 Installation of Optical Fiber Cables
(A) Listing
(B) Ducts Specifically Fabricated for Environmental Air
(C) Other Spaces Used for Environmental Air (Plenums)
(D) Risers — Cables in Vertical Runs
(E) Risers — Cables and Innerducts in Metal Raceways
(F) Risers — Cables in Fireproof Shafts
(G) Risers — One- and Two-Family Dwellings
(H) Cable Trays
(I) Distributing Frames and Cross-Connect Arrays
(J) Other Building Locations

770.114 Grounding

770.133 Installation of Optical Fibers and Electrical Conductors

(A) With Conductors for Electric Light, Power, Class 1, Non–Power-Limited Fire Alarm, or Medium Power Network-Powered Broadband Communications Circuits
Part VI. Listing Requirements
770.179 Optical Fiber Cables
(A) Types OFNP and OFCP
(B) Types OFNR and OFCR
(C) Types OFNG and OFCG
(D) Types OFN and OFC
(E) Circuit Integrity (CI) Cable or Electrical Circuit Protective System
(F) Field-Assembled Optical Fiber Cables
770.180 Grounding Devices

Article 800 Communications Circuits

Part I. General
800.1 Scope
800.2 Definitions
800.3 Other Articles
(A) Hazardous (Classified) Locations
(B) Wiring in Ducts for Dust, Loose Stock, or Vapor Removal
(C) Equipment in Other Space Used for Environmental Air
(D) Installation and Use
(E) Network-Powered Broadband Communications Systems
(F) Premises-Powered Broadband Communications Systems
(G) Optical Fiber Cable
(H) Temperature Limitation of Conductors

800.18 Installation of Equipment
800.21 Access to Electrical Equipment Behind Panels Designed to Allow Access

Part II. Wires and Cables Outside and Entering Buildings
800.44 Overhead (Aerial) Communications Wires and Cables
800.47 Underground Communications Wires and Cables Entering Buildings

Part III. Protection
800.90 Protective Devices

Part IV. Grounding Methods
800.93 Grounding or Interruption of Non–Current–Carrying Metallic Sheath Members of Communications Cables
800.94 Grounding Devices for Whose Grounding Is Required by Other Articles
### 2017 NEC Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>800.100 Cable and Primary Protector Bonding and Grounding</td>
<td></td>
</tr>
<tr>
<td>(A) Bonding Conductor or Grounding Electrode Conductor</td>
<td></td>
</tr>
<tr>
<td>(B) Electrode</td>
<td></td>
</tr>
<tr>
<td>(C) Electrode Connection</td>
<td></td>
</tr>
<tr>
<td>(D) Bonding of Electrodes</td>
<td></td>
</tr>
<tr>
<td>800.106 Primary Protector Grounding and Bonding at Mobile Homes</td>
<td></td>
</tr>
<tr>
<td>(A) Grounding</td>
<td></td>
</tr>
<tr>
<td>(B) Bonding</td>
<td></td>
</tr>
<tr>
<td><strong>Part V. Installation Methods Within Buildings</strong></td>
<td></td>
</tr>
<tr>
<td>800.110 Raceways and Cable Routing Assemblies for Communications Wires</td>
<td></td>
</tr>
<tr>
<td>and Cables</td>
<td></td>
</tr>
<tr>
<td>(A) Types of Raceways</td>
<td></td>
</tr>
<tr>
<td>(B) Raceway Fill for Communications Wires and Cables</td>
<td></td>
</tr>
<tr>
<td>(C) Cable Routing Assemblies</td>
<td></td>
</tr>
<tr>
<td>800.113 Installation of Communications Wires, Cables, and Cable</td>
<td></td>
</tr>
<tr>
<td>Routing Assemblies in Vertical Runs</td>
<td></td>
</tr>
<tr>
<td>(E) Risers — Cables, Raceways, and Cable Routing Assemblies in Fireproof</td>
<td></td>
</tr>
<tr>
<td>Shafts</td>
<td></td>
</tr>
<tr>
<td>(G) Risers — One- and Two-Family Dwellings</td>
<td></td>
</tr>
<tr>
<td><strong>Part VI. Listing Requirements</strong></td>
<td></td>
</tr>
<tr>
<td>800.170 Equipment</td>
<td></td>
</tr>
<tr>
<td>(A) Primary Protectors</td>
<td></td>
</tr>
<tr>
<td>(B) Secondary Protectors</td>
<td></td>
</tr>
<tr>
<td>(C) Plenum Grade Cable Ties</td>
<td></td>
</tr>
<tr>
<td>800.173 Drop Wire and Cable</td>
<td></td>
</tr>
<tr>
<td>800.179 Communications Wires and Cables</td>
<td></td>
</tr>
<tr>
<td>(A) Type CMP</td>
<td></td>
</tr>
<tr>
<td>(B) Type CMR</td>
<td></td>
</tr>
<tr>
<td>(C) Type CMG</td>
<td></td>
</tr>
<tr>
<td>(D) Type CM</td>
<td></td>
</tr>
<tr>
<td>(E) Type CMX</td>
<td></td>
</tr>
<tr>
<td>(F) Type CMUC Undercarpet Wires and Cables</td>
<td></td>
</tr>
<tr>
<td>(G) Circuit Integrity (CI) Cable or Electrical</td>
<td></td>
</tr>
<tr>
<td>Circuit Protective System</td>
<td></td>
</tr>
<tr>
<td>(H) Communications Wires</td>
<td></td>
</tr>
<tr>
<td>(I) Hybrid Power and Communications Cables</td>
<td></td>
</tr>
<tr>
<td>800.180 Grounding Devices</td>
<td></td>
</tr>
<tr>
<td>800.182 Cable Routing Assemblies and Communications Raceways</td>
<td></td>
</tr>
<tr>
<td>(A) Plenum Cable Routing Assemblies and Plenum Communications Raceways</td>
<td></td>
</tr>
<tr>
<td>(B) Riser Cable Routing Assemblies and Riser Communications Raceways</td>
<td></td>
</tr>
<tr>
<td>(C) General-Purpose Cable Routing Assemblies</td>
<td></td>
</tr>
</tbody>
</table>
and General-Purpose Communication Raceways

**Article 810 Radio and Television Equipment**

**Part I. General**

- **810.1 Scope**
- **810.2 Definitions**
- **810.3 Other Articles**
- **810.4 Community Television Antenna**
- **810.5 Radio Noise Suppressors**
- **810.6 Antenna Lead-In Protectors**
- **810.7 Grounding Devices**

**Part II. Receiving Equipment — Antenna Systems**

- **810.11 Material**
- **810.12 Supports**
- **810.13 Avoidance of Contacts with Conductors of Other Systems**
- **810.14 Splices**
- **810.15 Grounding**
- **810.16 Size of Wire-Strung Antenna — Receiving Station**
  (A) Size of Antenna Conductors
  (B) Self-Supporting Antennas
- **810.17 Size of Lead-in — Receiving Station**
- **810.18 Clearances — Receiving Stations**
  (A) Outside of Buildings
  (B) Antennas and Lead-ins — Indoors
  (C) In Boxes or Other Enclosures
- **810.19 Electrical Supply Circuits Used in Lieu of Antenna — Receiving Stations**
- **810.20 Antenna Discharge Units — Receiving Stations**
  (A) Where Required
  (B) Location
  (C) Grounding
- **810.21 Bonding Conductors and Grounding Electrode**

**Part III. Amateur and Citizen Band Transmitting and Receiving Stations — Antenna Systems**

- **810.51 Other Sections**
- **810.52 Size of Antenna**
- **810.53 Size of Lead-in Conductors**
- **810.54 Clearance on Building**
- **810.55 Entrance to Building**
- **810.56 Protection Against Accidental Contact**
- **810.57 Antenna Discharge Units — Transmitting Stations**
- **810.58 Bonding Conductors and Grounding Electrode Conductors — Transmitting and Receiving Stations**
  (A) Other Sections
  (B) Size of Protective Bonding Conductor or Grounding Electrode Conductor
  (C) Size of Operating Bonding Conductor or Grounding Electrode Conductor

**Part IV. Interior Installation — Transmitting Stations**

- **810.70 Clearance from Other Conductors**
- **810.71 General**
- **810.72 Bonding Conductors and Grounding Electrodes**
  (A) Enclosing
# Article 820 Community Antenna Television and Radio Distribution Systems

## Part I. General

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>820.1</td>
<td>Scope</td>
</tr>
<tr>
<td>820.2</td>
<td>Definitions</td>
</tr>
<tr>
<td>820.3</td>
<td>Other Articles</td>
</tr>
<tr>
<td>(A) Hazardous (Classified) Locations</td>
<td></td>
</tr>
<tr>
<td>(B) Wiring in Ducts for Dust, Loose Stock, or Vapor Removal</td>
<td></td>
</tr>
<tr>
<td>(C) Equipment in Other Space Used for Environmental Air</td>
<td></td>
</tr>
<tr>
<td>(D) Installation and Use</td>
<td></td>
</tr>
<tr>
<td>(E) Installations of Conductive and Nonconductive Optical Fiber Cables</td>
<td></td>
</tr>
<tr>
<td>(F) Communications Circuits</td>
<td></td>
</tr>
<tr>
<td>(G) Network-Powered Broadband Communications Systems</td>
<td></td>
</tr>
<tr>
<td>(H) Premises-Powered Broadband Communications Systems</td>
<td></td>
</tr>
<tr>
<td>(I) Alternate Wiring Methods</td>
<td></td>
</tr>
<tr>
<td>820.15</td>
<td>Power Limitations</td>
</tr>
<tr>
<td>820.21</td>
<td>Access to Electrical Equipment Behind Panels Designed to Allow Access</td>
</tr>
<tr>
<td>820.24</td>
<td>Mechanical Execution of Work</td>
</tr>
<tr>
<td>820.25</td>
<td>Abandoned Cables</td>
</tr>
<tr>
<td>820.26</td>
<td>Spread of Fire or Products of Combustion</td>
</tr>
</tbody>
</table>

## Part II. Coaxial Cables Outside and Entering Buildings

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>820.44</td>
<td>Overhead (Aerial) Coaxial Cables</td>
</tr>
<tr>
<td>(A) On Poles and In-Span</td>
<td></td>
</tr>
<tr>
<td>(B) Above Roofs</td>
<td></td>
</tr>
<tr>
<td>(C) On Masts</td>
<td></td>
</tr>
<tr>
<td>820.47</td>
<td>Underground Coaxial Cables Entering Buildings</td>
</tr>
<tr>
<td>(A) Underground Systems with Electric Light, Power, Class 1, or Non–Power-Limited Fire Alarm Circuit Conductors</td>
<td></td>
</tr>
<tr>
<td>(B) Direct-Buried Cables and Raceways</td>
<td></td>
</tr>
<tr>
<td>820.48</td>
<td>Unlisted Cables Entering Buildings</td>
</tr>
<tr>
<td>820.49</td>
<td>Metallic Entrance Conduit Grounding</td>
</tr>
</tbody>
</table>

## Part III. Protection

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>820.93</td>
<td>Grounding of the Outer Conductive Shield of Coaxial Cables</td>
</tr>
<tr>
<td>(A) Entering Buildings</td>
<td></td>
</tr>
<tr>
<td>(B) Terminating Outside of the Building</td>
<td></td>
</tr>
<tr>
<td>(C) Location</td>
<td></td>
</tr>
<tr>
<td>(D) Hazardous (Classified) Locations</td>
<td></td>
</tr>
</tbody>
</table>

## Part IV. Grounding Methods

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>820.100</td>
<td>Cable Bonding and Grounding</td>
</tr>
<tr>
<td>(A) Bonding Conductor or Grounding Electrode Conductor</td>
<td></td>
</tr>
<tr>
<td>(B) Electrode</td>
<td></td>
</tr>
<tr>
<td>(C) Electrode Connection</td>
<td></td>
</tr>
<tr>
<td>(D) Bonding of Electrodes</td>
<td></td>
</tr>
<tr>
<td>(E) Shield Protection Devices</td>
<td></td>
</tr>
</tbody>
</table>

## Part V. Installation Methods Within Buildings

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>820.103</td>
<td>Equipment Grounding</td>
</tr>
<tr>
<td>820.106</td>
<td>Grounding and Bonding at Mobile Homes</td>
</tr>
<tr>
<td>(A) Grounding</td>
<td></td>
</tr>
<tr>
<td>(B) Bonding</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>820.110</td>
<td>Raceways and Cable Routing Assemblies for Coaxial Cables</td>
</tr>
<tr>
<td>(A) Types of Raceways</td>
<td></td>
</tr>
<tr>
<td>(B) Raceway Fill for Coaxial Cables</td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>Reference</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>(C) Cable Routing Assemblies</td>
<td>Part I. General</td>
</tr>
<tr>
<td>820.113 Installation of Coaxial Cables</td>
<td>830.1 Scope</td>
</tr>
<tr>
<td>(A) Listing</td>
<td>830.2 Definitions</td>
</tr>
<tr>
<td>(B) Ducts Specifically Fabricated for Environmental Air</td>
<td>830.3 Other Articles</td>
</tr>
<tr>
<td>(C) Other Spaces Used For Environmental Air (Plenums)</td>
<td>(A) Hazardous (Classified) Locations</td>
</tr>
<tr>
<td>(D) Risers — Cables in Vertical Runs</td>
<td>(B) Wiring in Ducts for Dust, Loose Stock,</td>
</tr>
<tr>
<td>(E) Risers — Cables and Innerducts in Metal Raceways</td>
<td>or Vapor Removal</td>
</tr>
<tr>
<td>(F) Risers — Cables in Fireproof Shafts</td>
<td>(C) Equipment in Other Space Used</td>
</tr>
<tr>
<td>(G) Risers — One- and Two-Family Dwellings</td>
<td>for Environmental Air</td>
</tr>
<tr>
<td>(H) Cable Trays</td>
<td>(D) Installation and Use</td>
</tr>
<tr>
<td>(I) Distributing Frames and Cross-Connect Arrays</td>
<td>(E) Output Circuits</td>
</tr>
<tr>
<td>(J) Other Building Locations</td>
<td>(F) Protection Against Physical Damage</td>
</tr>
<tr>
<td>(K) One- and Two-Family and Multifamily Dwellings</td>
<td>830.15 Power Limitations</td>
</tr>
<tr>
<td>820.133 Installation of Coaxial Cables and Equipment</td>
<td>830.21 Access to Electrical Equipment Behind Panels</td>
</tr>
<tr>
<td>(A) Separation from Other Conductors</td>
<td>Designed to Allow Access</td>
</tr>
<tr>
<td>(B) Support of Coaxial Cables</td>
<td>830.24 Mechanical Execution of Work</td>
</tr>
<tr>
<td>820.154 Applications of Listed CATV Cables</td>
<td>830.25 Abandoned Cables</td>
</tr>
<tr>
<td>Part VI. Listing Requirements</td>
<td>830.26 Spread of Fire or Products of Combustion</td>
</tr>
<tr>
<td>820.179 Coaxial Cables</td>
<td>Part II. Cables Outside and Entering Buildings</td>
</tr>
<tr>
<td>(A) Type CATVP</td>
<td>830.40 Entrance Cables</td>
</tr>
<tr>
<td>(B) Type CATVR</td>
<td>(A) Medium-Power Circuits</td>
</tr>
<tr>
<td>(C) Type CATV</td>
<td>(B) Low-Power Circuits</td>
</tr>
<tr>
<td>(D) Type CATVX</td>
<td>830.44 Overhead (Aerial) Cables</td>
</tr>
<tr>
<td>820.180 Grounding Devices</td>
<td>(A) On Poles and In-Span</td>
</tr>
<tr>
<td>Article 830 Network-Powered Broadband Communications Systems</td>
<td>(B) Above Roofs</td>
</tr>
<tr>
<td>830.47 Underground Network-Powered Broadband Communications Cables Entering Buildings</td>
<td>(C) Clearance from Ground</td>
</tr>
<tr>
<td></td>
<td>(D) Over Pools</td>
</tr>
<tr>
<td></td>
<td>(E) Final Spans</td>
</tr>
<tr>
<td></td>
<td>(F) Between Buildings</td>
</tr>
<tr>
<td></td>
<td>(G) On Buildings</td>
</tr>
</tbody>
</table>

121 | Page
and Power, Class 1, or Non–Power-Limited

Fire Alarm Circuit Conductors

(B) Direct-Buried Cables and Raceways

(C) Mechanical Protection

(D) Pools

830.49 Metallic Entrance Conduit Grounding

Part III. Protection

830.90 Primary Electrical Protection

(A) Application

(B) Location

(C) Hazardous (Classified) Locations

830.93 Grounding or Interruption of Metallic Members of Network-Powered Broadband Communications Cables

(A) Entering Buildings

(B) Terminating Outside of the Building

Part IV. Grounding Methods

830.100 Cable, Network Interface Unit, and Primary Protector Bonding and Grounding

(A) Bonding Conductor or Grounding Electrode Conductor

(B) Electrode

(C) Electrode Connection

(D) Bonding of Electrodes

830.106 Grounding and Bonding at Mobile Homes

(A) Grounding

(B) Bonding

Part V. Installation Methods Within Buildings

830.110 Raceways and Cable Routing Assemblies for Network-Powered Broadband Communications Cables

(A) Types of Raceways

(B) Raceway Fill for Network-Powered Communications Cables

830.113 Installation of Network-Powered Broadband Communications Cables

(A) Listing

(B) Ducts Specifically Fabricated for Environmental Air

(C) Other Spaces Used For Environmental Air (Plenums)

(D) Risers — Cables in Vertical Runs

(E) Risers — Cables and Innerducts in Metal Raceways

(F) Risers — Cables in Fireproof Shafts

(G) Risers — One- and Two-Family Dwellings

(H) Cable Trays

(I) Other Building Locations

830.133 Installation of Network-Powered Broadband Communications Cables and Equipment

(A) Separation of Conductors

(B) Support of Network-Powered Broadband Communications Cables

830.154 Applications of Network-Powered Broadband Communications System Cables

830.160 Bends

Part VI. Listing Requirements

830.179 Network-Powered Broadband Communications Equipment and Cables

(A) Network-Powered Broadband Communications Medium-Power Cables

(B) Network-Powered Broadband Communication Low-Power Cables

830.180 Grounding Devices

Article 840 Premises-Powered Broadband
Communications Systems

Part I. General
840.1 Scope
840.2 Definitions
840.3 Other Articles
(A) Hazardous (Classified) Locations
(B) Cables in Ducts for Dust, Loose Stock, or Vapor Removal
(C) Equipment in Other Space Used for Environmental Air
(D) Installation and Use
(E) Output Circuits
(F) Other Communications Systems
(G) Electrical Classification of Data Circuits and Cables

Part II. Cables Outside and Entering Buildings
840.44 Overhead (Aerial) Optical Fiber Cables
(A) On Poles and In-Span
(B) Above Roofs
840.45 Overhead (Aerial) Communications Wires and Cables
840.46 Overhead (Aerial) Coaxial Cables
840.47 Underground Wires and Cables Entering Buildings
(A) Optical Fiber Cables
(B) Communications Wires and Cables
(C) Coaxial Cables
840.48 Unlisted Wires and Cables Entering Buildings

Part III. Protection
840.90 Protective Devices
840.93 Grounding or Interruption
(A) Non–Current-Carrying Metallic Members of Optical Fiber Cables
(B) Communications Cables
(C) Coaxial Cables

Part IV. Grounding Methods
840.100 Network Terminal and Cable Grounding
840.101 Premises Circuits Not Leaving the Building
(A) Coaxial Cable Shield Grounding
(B) Communications Circuit Grounding
(C) Network Terminal Grounding
840.106 Grounding and Bonding at Mobile Homes
(A) Grounding
(B) Bonding

Part V. Installation Methods Within Buildings
840.110 Raceways and Cable Routing Assemblies
(A) Optical Fiber Cables
(B) Multipair Communications Cables
(C) Coaxial Cables
840.113 Installation on the Customer Premises Side of the Network Terminal
(A) Premises Communications Circuits
(B) Premises Community Antenna Television (CATV) Circuits
840.133 Installation of Optical Fibers and Electrical Conductors
840.154 Applications of Listed Optical Fiber Cables
Part VI. Premises Powering of Communications Equipment over Communications Cables
840.160 Powering Circuits

Part VII. Listing Requirements
840.170 Equipment and Cables
(A) Network Terminal
(B) Optical Fiber Cables
(C) Communications Equipment
(D) Cable Routing Assemblies and Communications Raceways
(E) Premises Communications Wires and Cables
(F) Premises Community Antenna Television (CATV) Circuits
(G) Power Source
(H) Accessory Equipment
840.180 Grounding Devices

Chapter 9 Tables
Table 1 Percent of Cross Section of Conduit and Tubing for Conductors and Cables
Table 2 Radius of Conduit and Tubing Bends
Table 4 Dimensions and Percent Area of Conduit and Tubing (Areas of Conduit or Tubing for the Combinations of Wires Permitted in Table 1, Chapter 9)
Table 5 Dimensions of Insulated Conductors and Fixture Wires
Table 5A Compact Copper and Aluminum Building Wire Nominal Dimensions and Areas
Table 8 Conductor Properties
Table 9 Alternating-Current Resistance and Reactance for 600-Volt Cables, 3-Phase, 60 Hz, 75ºC (167ºF) — Three Single Conductors in Conduit
Table 10 Conductor Stranding

Table 11(A) Class 2 and Class 3 Alternating-Current Power Source Limitations
Table 11(B) Class 2 and Class 3 Direct-Current Power Source Limitations
Table 12(A) PLFA Alternating-Current Power Source Limitations
Table 12(B) PLFA Direct-Current Power Source Limitations