

## SECTION 16140 - WIRING DEVICES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. All sections of Division 15 and 16 apply to this section.
- C. Other related Divisions are as follows:
  - 1. Division 17.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
  - 2. Twist-locking receptacles.
  - 3. Receptacles with integral surge suppression units.
  - 4. Wall-box motion sensors.
  - 5. Isolated-ground receptacles.
  - 6. Snap switches and wall-box dimmers.
  - 7. Solid-state fan speed controls.
  - 8. Wall-switch.
  - 9. Communications outlets.
  - 10. Pendant cord-connector devices.
  - 11. Cord and plug sets.
  - 12. Floor service outlets, poke-through assemblies, service poles, and multi outlet assemblies.

#### 1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. MMTV: Media Management TV System
- D. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- E. RFI: Radio-frequency interference.
- F. TVSS: Transient voltage surge suppressor.

- G. UTP: Unshielded twisted pair.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: Wiring devices shall be provided with all manufacturers' packing label warnings and instruction manuals that include labeling conditions. Provide a collection of manufacturer recommended operation and maintenance practices for each type of product including, but not limited to:
  - 1. Tools required.
  - 2. Acceptable cleaners and recommended cleaning practices.
  - 3. Replacement parts list.
  - 4. Manufacturer service department contact information.
  - 5. Submittal data.
  - 6. Intended operation narrative.

#### 1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in the City of Chicago Electrical Code, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 101.
- D. Comply with City of Chicago Electrical Code.

#### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Effectively protect all materials, accessories, and components from any damage or injury from the time of fabrication until final Owner acceptance.
- B. Deliver equipment in fully enclosed vehicles after specified environmental conditions have been permanently established in spaces where equipment is to be placed.
- C. Store equipment in spaces with environments controlled within manufacturer's ambient temperature and humidity tolerances for non-operating equipment.

## 1.7 COORDINATION

- A. Receptacles for Owner-Furnished Equipment: Match plug configurations.

~~1. Cord and Plug Sets: Match equipment requirements.~~

## 1.8 EXTRA MATERIALS

- A. Furnish extra materials described in subparagraphs below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Service/Power Poles: One for every 10, but no less than one.
  2. Floor Service Outlet Assemblies: One for every 10, but no less than one.
  3. Poke-Through, Fire-Rated Closure Plugs: One for every five floor service outlets installed, but no less than two.
  4. TVSS Receptacles: One for every 10 of each type installed, but no less than two of each type.

## 1.9 LEED REQUIREMENTS

- A. Within 30-days after the date of system acceptance, record drawings of the actual installation shall be provided to the building owner.
- B. Implement an independent commissioning authority to review the contractor submittals relative to systems being commissioned.
- C. Implement providing the owner with a single manual that contains the information required for re-commissioning building systems.
- D. Use a minimum of 20% of wiring devices that are manufactured regionally within a radius of 500 miles.

## 1.10 WARRANTY

- A. The manufacturer shall unconditionally warrant all equipment and systems provided under this section to be free from defects in materials and workmanship for a period of at least twelve months from the date of final acceptance of all work of this section.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:

1. Wiring Devices:
  - a. Cooper Wiring Devices; a division of Cooper Industries, Inc.
  - b. Hubbell Incorporated; Wiring Device-Kellems
  - c. Leviton Mfg. Company Inc.
  - d. Pass & Seymour/Legrand; Wiring Devices & Accessories
2. Poke-Through, Floor Service Outlets, and Telephone/Power Poles:
  - a. Hubbell, Inc.
  - b. Pass & Seymour/Legrand; Wiring Devices & Accessories
  - c. Square D Co.
3. Wiremold Co. Multi-Outlet Assemblies:
  - a. Hubbell Incorporated; Wiring Device-Kellems.
  - b. Wiremold Co.

## 2.2 STRAIGHT BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
- B. Isolated-Ground, Duplex Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
  1. Description: Straight blade; equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

## 2.3 GFCI RECEPTACLES

- A. General Description: Straight blade, non-feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped. Units shall fit in a 2-3/4" deep outlet box without an adapter.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

## 2.4 TVSS RECEPTACLES

- A. General Description: Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 1449, with integral TVSS in line to ground, line to neutral, and neutral to ground.
  1. TVSS Components: Multiple metal-oxide varistors; with a nominal clamp-level rating of 400 volts and minimum single transient pulse energy dissipation of 240 J, according to IEEE C62.41.2 and IEEE C62.45.
  2. Active TVSS Indication: Visual and audible, with light visible in face of device to indicate device is "active" or "no longer in service."

B. Duplex TVSS Convenience Receptacles:

1. Description: Straight blade, 125 V, 20 A; NEMA WD 6 configuration 5-20R.

C. Isolated-Ground, Duplex Convenience Receptacles:

1. Description: Straight blade, 125 V, 20 A; NEMA WD 6 configuration 5-20R. Equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

2.5 HAZARDOUS (CLASSIFIED) LOCATION RECEPTACLES

- A. Wiring Devices for Hazardous (Classified) Locations: Comply with NEMA FB 11 and UL 1010.

2.6 TWIST-LOCKING RECEPTACLES

- A. Single Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration L5-20R, and UL 498.

B. Isolated-Ground, Single Convenience Receptacles, 125 V, 20 A:

1. Description: Comply with NEMA WD 1, NEMA WD 6 configuration L5-20R, and UL 498. Equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

2.7 PENDANT CORD-CONNECTOR DEVICES

- A. Description: Matching, locking-type plug and receptacle body connector; NEMA WD 6 configurations L5-20P and L5-20R, heavy-duty grade.

1. Body: Nylon with screw-open cable-gripping jaws and provision for attaching external cable grip.
2. External Cable Grip: Woven wire-mesh type made of high-strength galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

2.8 Not Used

2.8 ~~CORD AND PLUG SETS~~

~~A. Description: Match voltage and current ratings and number of conductors to requirements of equipment being connected.~~

- ~~1. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and equipment-rating ampacity plus a minimum of 30 percent.~~
- ~~2. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.~~

2.9 SNAP SWITCHES

- A. Comply with NEMA WD 1 and UL 20.
- B. Switches, 120/277 V, 20 A:
- C. Pilot Light Switches, 20 A:
  1. Description: Single pole, with neon-lighted handle, illuminated when switch is "ON."
- D. Key-Operated Switches, 120/277 V, 20 A:
  1. Description: Single pole, with factory-supplied key in lieu of switch handle.
- E. Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors.
- F. Key-Operated, Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors, with factory-supplied key in lieu of switch handle.

2.10 WALL-BOX DIMMERS

- A. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.
- B. Control: Continuously adjustable slider; with single-pole or three-way switching. Comply with UL 1472.
- C. Incandescent Lamp Dimmers: 120 V; control shall follow square-law dimming curve. On-off switch positions shall bypass dimmer module.
  1. 600 W; dimmers shall require no derating when ganged with other devices.

- D. Fluorescent Lamp Dimmer Switches: Modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 20 percent of full brightness.

## 2.11 FAN SPEED CONTROLS

- A. Modular, 120-V, full-wave, solid-state units with integral, quiet on-off switches and audible frequency and EMI/RFI filters. Comply with UL 1917.
  - 1. Continuously adjustable slider, 5 A.
  - 2. Three-speed adjustable slider, 1.5 A.

## 2.12 COMMUNICATIONS OUTLETS

- A. Category 5e Outlet:
  - 1. Comply with requirements of Division 17 Section "Communications Horizontal Cabling" for Category 5e UTP components.
- B. Category 6 Outlet:
  - 1. Comply with requirements of Division 17 Section "Communications Horizontal Cabling" for Category 6 UTP components.
- C. Media Management TV System Outlet:
  - 1. Comply with requirements of Division 17 Section "Media Management TV System" for MMTV Category 6 UTP and coaxial cabling components.

## 2.13 WALL PLATES

- A. Single and combination types to match corresponding wiring devices.
  - 1. Plate-Securing Screws: Metal with head color to match plate finish.
  - 2. Material for Finished Spaces: 0.035-inch thick, satin-finished stainless steel except as noted otherwise on drawings.
  - 3. Material for Unfinished Spaces: Galvanized steel.
  - 4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant, die-cast aluminum with lockable cover.

## 2.14 FLOOR SERVICE FITTINGS

- A. Type: Modular, flush-type, dual-service units suitable for wiring method used.

- B. Compartments: Barrier separates power from voice and data communication cabling.
- C. Service Plate: Rectangular, die-cast aluminum with satin finish.
- D. Power Receptacle: NEMA WD 6 configuration 5-20R, gray finish, unless otherwise indicated.
- E. Communications Outlet: Modular, color-coded RJ45 jacks for UTP cable. Coordinate jack type with drawing requirements and Division 17 Section "Communications Horizontal Cabling".

#### 2.15 POKE-THROUGH ASSEMBLIES

- A. Description: Factory-fabricated and -prewired assembly of below-floor junction box with multichanneled, through-floor raceway/fire stop unit and detachable matching floor service outlet assembly as specified above.
  - 1. Service Outlet Assembly: Flush type with devices coordinated with drawings and Division 17 Section "Communications Horizontal Cabling".
  - 2. Size: Selected to fit nominal 3-inch cored holes in floor and matched to floor thickness.
  - 3. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.
  - 4. Closure Plug: Arranged to close unused 3-inch cored openings and reestablish fire rating of floor.
  - 5. Wiring Raceways and Compartments: Sized for a minimum of four No. 12 AWG conductors and a minimum of four (4) 4-pair Category 6 UTP communication cables. Comply with requirements of Division 17 Section "Communications Horizontal Cabling" for Category 6 UTP components.
  - 6. Communications Outlets: Modular, color-coded RJ45 jacks for UTP cable. Coordinate jack type with drawing requirements and Division 17 Section "Communications Horizontal Cabling".

#### 2.16 MULTIOUTLET ASSEMBLIES

- A. Components of Assemblies: Products from a single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.
- B. Raceway Material: Metal, with manufacturer's standard corrosion-resistant finish.
- C. Wire: No. 12 AWG.

#### 2.17 SERVICE POLES

- A. Description: Factory-assembled and -wired units to extend power and voice and data communication from distribution wiring concealed in ceiling to devices or outlets in pole near floor.

1. Poles: Nominal 2.5-inch-square cross section, with height adequate to extend from floor to at least 6 inches above ceiling, and with separate channels for power wiring and voice and data communication cabling.
2. Mounting: Ceiling trim flange with concealed bracing arranged for positive connection to ceiling supports; with pole foot and carpet pad attachment.
3. Finishes: Manufacturer's standard painted finish and trim combination.
4. Wiring Raceways and Compartments: Sized for minimum of five No. 12 AWG power and ground conductors and a minimum of four (4) 4-pair Category 6 UTP communication cables. Comply with requirements of Division 17 Section "Communications Horizontal Cabling" for Category 6 UTP components
5. Power Receptacles: Two duplex, 20-A, heavy-duty, NEMA WD 6 configuration 5-20R units.
6. Communications Outlets: Modular, color-coded RJ45 jacks for UTP cable. Coordinate jack type with drawing requirements and Division 17 Section "Communications Horizontal Cabling".

## 2.18 FINISHES

### A. Color:

1. Wiring Devices Connected to Normal Power System: Ivory, unless otherwise indicated or required by Chicago Electrical Code or device listing.
2. Wiring Devices Connected to Emergency Power System: Solid Red.
3. TVSS Devices: Solid Blue.
4. Isolated-Ground Receptacles: ~~As specified above, with solid Orange triangle on face.~~

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.
- B. Coordination with Other Trades:
  1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
  2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
  3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
  4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:

1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
  2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
  3. The length of free conductors at outlets for devices shall meet provisions of Chicago Electrical Code, without pigtails.
  4. Existing Conductors:
    - a. Cut back and pigtail, or replace all damaged conductors.
    - b. Straighten conductors that remain and remove corrosion and foreign matter.
    - c. Pigtailling existing conductors is permitted provided the outlet box is large enough.
- D. Device Installation:
1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
  2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
  3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
  4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
  5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
  6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
  7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
  8. Tighten unused terminal screws on the device.
  9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.
- E. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
- F. Dimmers:
1. Install dimmers within terms of their listing.
  2. Verify that dimmers used for fan speed control are listed for that application.
  3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.
- G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.
- H. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings. Isolated Ground Receptacles: Connect to isolated grounding conductor routed to designated isolated equipment ground terminal of electrical system.

### 3.2 IDENTIFICATION

- A. Comply with Division 16 Section "Electrical Identification."
  - 1. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.
  - 2. Switches: Where 3 or more switches are ganged, and elsewhere where indicated, identify each switch with approved legend engraved with black-filled lettering on face of wall plate.

### 3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
  - 1. Test Instruments: Use instruments that comply with UL 1436.
  - 2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.
  - 3. Test Wiring Devices: Test wiring devices for proper polarity and ground continuity. Operate each operable device at least 6 times.
- B. Tests for Convenience Receptacles:
  - 1. Line Voltage: Acceptable range is 105 to 132 V.
  - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.
  - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
  - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
  - 5. Using the test plug, verify that the device and its outlet box are securely mounted.
  - 6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- C. Replace damaged or defective components.

### 3.4 CLEANING

- A. The contractor shall remove all paint spatters and other spots, dirt and debris from the equipment. Clean equipment and devices internally and externally using methods and materials recommended by the manufacturer. Replace stained or improperly painted wall plates or devices.

### 3.5 CONTRACTOR STARTUP AND REPORTING

- A. Contractor shall prepare and submit a complete set of record drawings, test reports, operation and maintenance data and certificates as outlined in this section.

CPS Control Rev: ~~1\_02/28/06~~2\_12/04/08  
Project Rev: ~~A\_02/28/06~~A\_12/04/08CPS Control Rev: 1\_2/28/06  
Project Rev: A\_XXX

### 3.6 COMMISSIONING AND DEMONSTRATION

- A. After system checkout and adjustment, the contractor shall operate the system for the review of the owner and architect. Necessary adjustments or modifications shall be made as required by the owner or architect.

END OF SECTION 16140